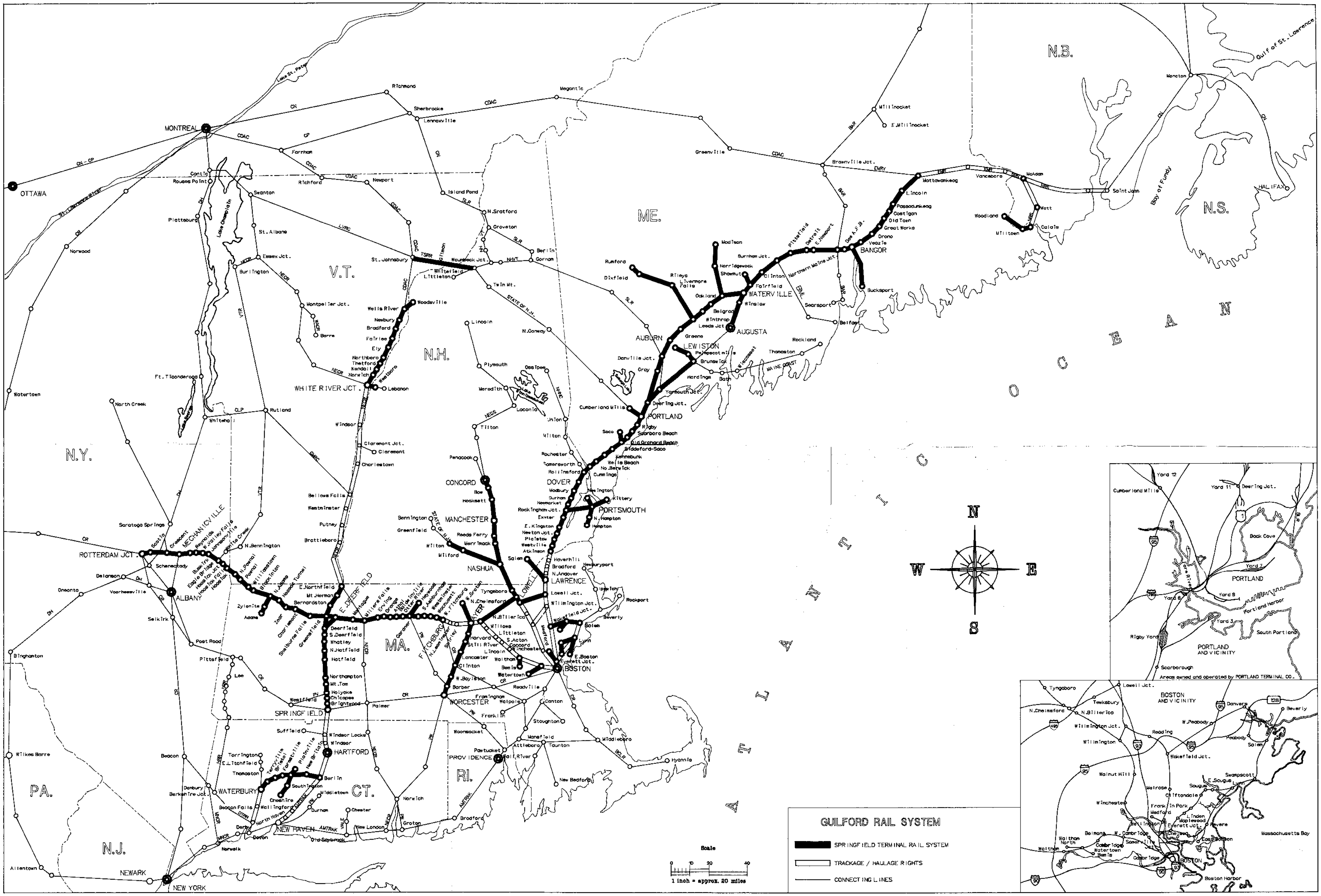
Appendix A: Guilford Rail System Map


GUILFORD RAIL SYSTEM
SPRINGFIELD TERMINAL RAIL SYSTEM
TRACKAGE / HAULAGE RIGHTS
CONNECTING LINES
Scale
0
10
20
40
1 inch = approx. 20 miles
N
S
E
W
ATLANTIC OCEAN
Gulf of St. Lawrence
Bay of Fundy
Lake Champlain
N.B.
N.S.
ME.
N.H.
V.T.
MA.
R.I.
CT.
N.Y.
N.J.
PA.
MONTREAL
OTTAWA
HALIFAX
Moncton
Saint John
McAdam
Vanceboro
Mattawamkeag
Lincoln
Passadumkeag
Costigan
Old Town
Great Works
Orono
Veazie
BANGOR
Bucksport
Searsport
Belfast
Northern Maine Jct.
E. Newport
Detroit
Pittsfield
Burnham Jct.
Clinton
Fairfield
WATERVILLE
Winslow
Madison
Norridgewock
Shawmut
Oakland
Belgrade
Winthrop
Leeds Jct.
AUGUSTA
Rumford
Dixfield
Riley
Livermore Falls
AUBURN
LEWISTON
Greene
Danville Jct.
Gray
Pejepscot Mills
Brunswick
Hardings
Bath
Rockland
Thomaston
Yarmouth Jct.
Deering Jct.
PORTLAND
Cumberland Mills
Rigby
Scarboro Beach
Old Orchard Beach
Biddeford-Saco
Saco
Kennebunk
Wells Beach
No. Berwick
Cummings
Rollinsford
Somersworth
Rochester
DOVER
PORTSMOUTH
Kittery
N. Hampton
Hampton
Newington
Durham
Newmarket
Rockingham Jct.
Exeter
E. Kingston
Newton Jct.
Plaistow
Westville
Atkinson
Haverhill
Bradford
N. Andover
LAWRENCE
Lowell Jct.
Wilmington Jct.
LOWELL
N. Billerica
N. Chelmsford
Tyngsboro
NASHUA
MANCHESTER
Reeds Ferry
Merrimack
CONCORD
Bow
Hooksett
Penacook
Tilton
Laconia
Meredith
Plymouth
Lincoln
N. Conway
Ossipee
Union
Milton
Milford
Wilton
Greenfield
Bennington
Salem
Newburyport
Ipswich
Rockport
Beverly
Salem
Lynn
Wakefield Jct.
E. Boston
Everett Jct.
BOSTON
Medford
Winchester
Waltham
Bemis
Watertown
Concord
S. Acton
Littleton
Willows
Harvard
Still River
Lancaster
Clinton
W. Boylston
Barber
WORCESTER
Framingham
Walpole
Readville
Canton
Stoughton
Franklin
Woonsocket
Pawtucket
PROVIDENCE
Attleboro
Mansfield
Taunton
Fall River
New Bedford
Middleboro
Hyannis
AYER
FITCHBURG
Gardner
Westminster
Wachusett
S. Ashburnham
Baldwinville
Athol
Orange
Erving
Millers Falls
Montague
E. DEERFIELD
E. Northfield
Mt. Hermon
Bernardston
Greenfield
Deerfield
S. Deerfield
Whatley
N. Hatfield
Hatfield
Northampton
Mt. Tom
Holyoke
Chicopee
Brightwood
SPRINGFIELD
Westfield
Palmer
Suffield
Windsor Locks
Windsor
HARTFORD
New Britain
Berlin
Plainville
Forestville
Bristol
Terryville
Southington
Cheshire
Wallingford
WATERBURY
Thomaston
Torrington
E. Litchfield
Beacon Falls
Derby
Devon
North Haven
NEW HAVEN
Durham
Middletown
Chester
New London
Old Saybrook
Groton
Norwich
Bradford
Norwalk
Danbury
Berkshire Jct.
Beacon
NEW YORK
NEWARK
Allentown
Wilkes Barre
Binghamton
Oneonta
Delanson
Voorheesville
Selkirk
ALBANY
Schenectady
ROTTERDAM JCT.
Scotia
Crescent
MECHANICVILLE
Saratoga Springs
N. Bennington
Pownal
Williamstown
N. Adams
Hoosac Tunnel
Zoar
Charlemont
Shelburne Falls
Zylonite
Adams
Pittsfield
Lee
Post Road
Whitehall
Ft. Ticonderoga
North Creek
Watertown
Norwood
Plattsburg
Rouses Point
Cantic
Swanton
St. Albans
Essex Jct.
Burlington
Rutland
Montpelier Jct.
Barre
WHITE RIVER JCT.
Lebanon
Westboro
Norwich
Kendall
Thetford
Northboro
Ely
Fairlee
Bradford
Newbury
Wells River
Woodsville
Windsor
Claremont Jct.
Claremont
Charlestown
Bellows Falls
Westminster
Putney
Brattleboro
St. Johnsbury
Whitefield
Littleton
Waumbeck Jct.
Twin Mt.
Berlin
Gorham
Groveton
N. Stratford
Island Pond
Newport
Richford
Farnham
Sherbrooke
Lennoxville
Richmond
Megantic
Greenville
Brownville Jct.
Millinocket
E. Millinocket
Woodland
Milltown
Calais
Watt
CN
CP
CDAC
SLR
BAR
EMRY
MEC
LVRC
NECR
TSRR
VTR
CLP
GMRC
NHVT
CR
MNCR
AMTRAK
PW
BCLR
NHNC
NEGS
STATE OF N.H.
MAINE COAST
PORTLAND AND VICINITY
Areas owned and operated by PORTLAND TERMINAL CO.
Yard 12
Yard 11
Deering Jct.
Cumberland Mills
Back Cove
Yard 7
PORTLAND
Yard 8
Yard 6
Fore River
Portland Harbor
Yard 3
South Portland
Rigby Yard
Scarborough
BOSTON AND VICINITY
Tyngsboro
Lowell Jct.
Tewksbury
N. Chelmsford
N. Billerica
Wilmington Jct.
Wilmington
Reading
Wakefield Jct.
W. Peabody
Peabody
Danvers
Beverly
Salem
Swampscott
Lynn
E. Saugus
Saugus
Walnut Hill
Melrose
Cliftondale
Winchester
Franklin Park
Medford
Linden
Maplewood
Everett Jct.
Revere
Wellington
Chelsea
East Boston
Belmont
W. Cambridge
Somerville
Cambridge
Watertown
Bemis
Waltham North
Waltham
BOSTON
Boston Harbor
Massachusetts Bay

Appendix B: Station Profile Sheets

Station: Porter Square

Location: Porter Square, Cambridge

Parking: None

ADA Access: Yes. Elevator from street level. Escalator from Red Line Station. Mini highs at platform level.

Station Amenities:

- Indoor Facilities: Yes. Concession stands. Indoor seating and waiting area.
- Bike Spaces: 34

Station Owned and Operated by: MBTA

Pass Sales: No

Other Transit Connections: Red Line, MBTA Bus Routes 77, 77A, 83, 96

Porter Square Commuter Rail Station

Porter Square Red Line Station

Commuter Rail Inbound Platform

Mini High Accessible Platform

Station: Belmont

Location: Common Ave. and Concord Ave., Belmont

Parking: None

ADA Access: No

Station Amenities:

- Covered Enclosures: Inbound side: Covered canopy. No seating.
  Outbound side: No canopy. Some seating.
- Bike Spaces: 8

Station Owned and Operated by: Town of Belmont

Pass Sales: No

Other Transit Connections: MBTA Bus Routes 72, 74/75

Belmont Station – Concord Ave. side

Access to Inbound Platform – Pleasant Ave.

Belmont Station Underpass

Inbound Platform

Station: Waverley

Location: Trapelo Rd., Belmont

Parking: None

ADA Access: No

Station Amenities:

Covered Enclosures: Inbound side: Covered canopy. Some seating. Outbound side: Covered canopy. Some seating.

Bike Spaces: 8

Station Owned and Operated by: Town of Belmont

Pass Sales: No

Other Transit Connections: MBTA Bus Routes ____

Waverley Station – viewed toward Trapelo Rd.

Entrance to Inbound Platform

Waverley Station Inbound

Waverley Station Outbound

Station: Waltham

Location: Moody St. and Elm St., Waltham

Parking: Commuter: 36 + 2 disabled; Resident: 26 + 2 disabled

ADA Access: No

Station Amenities:

Covered Enclosures: Yes. Limited seating.

Bike Spaces: 8

Station Owned and Operated by: City of Waltham

Pass Sales: Yes. Affordable Dry Cleaners – cash, checks

Other Transit Connections: MBTA Bus Routes 70, 70A, 170, 505, 553, 554, 556

Waltham Station Inbound Train

Waltham Outbound Boarding Area

Waltham Station Inbound Boarding Area

Police Station at Inbound Area of Station

Station: Brandeis/Roberts

Location: South St and Sawyer St., Waltham

Parking: Commuter: 70 + 3; Inbound side: 24

ADA Access: No

Station Amenities:

- Covered Enclosures: Yes. Limited seating.
- Bike Spaces: 8

Station Owned and Operated by: City of Waltham

Pass Sales: No

Other Transit Connections: MBTA Bus Routes 70, 70A, 170, 505, 553, 554, 556

Brandeis/Roberts Outbound Platform

Brandeis/Roberts Inbound View

Brandeis/Roberts Outbound Train Minihigh

Station: Kendal Green

Location: Church St., Weston

Parking: Town owned spaces: 52

ADA Access: No

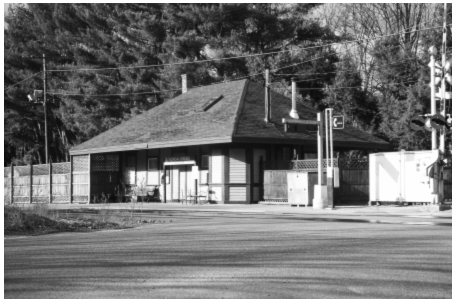
Station Amenities:

- Covered Enclosure: Yes. Station building also a private residence. Some seating.
- Bike Spaces: 0

Station Owned and Operated by: Town of Weston

Pass Sales: No

Other Transit Connections: No



Kendal Green Station Building Outbound side

Boarding Area Viewed from Station Building

Kendal Green Parking Area

Kendal Green Roadside Parking

Station: Hastings

Hastings Station Enclosure

Location: Viles St., Weston

Parking: Town owned spaces: 9

ADA Access: No

Station Amenities:

Covered Enclosures: Small enclosure with limited seating on outbound side. No platforms, boarding at grade.

Bike Spaces: 0

Station Owned and Operated by: Town of Weston

Pass Sales: No

Other Transit Connections: No

Station: Silver Hill

Location: Merriam St. and Silver Hill St., Weston

Parking: Town owned spaces: 6

ADA Access: No

Station Amenities:

Covered Enclosures: Small enclosure with limited seating on outbound side. No platforms, boarding at grade.

Bike Spaces: 0

Station Owned and Operated by: Town of Weston

Pass Sales: No

Other Transit Connections: No

Silver Hill from Merriam St.

Silver Hill Parking and Access to Trains

Silver Hill Parking

Station: Lincoln

Location: Lincoln Rd. near Rt. 117, Lincoln

Parking: Commuter Parking: 100; Resident Parking: 60

ADA Access: No

Station Amenities:

- Covered Enclosures: No
- Bike Spaces: 21

Station Owned and Operated by: Town of Lincoln

Pass Sales: No

Other Transit Connections: No

Lincoln Parking Outbound Side

Commuter Parking Payment System

Inbound Side and Resident Parking

Resident Parking Inbound Side

Station: Concord

Location: Thoreau St., Concord

Parking: 24 + 1 disabled

ADA Access: No

Station Amenities:

- Covered Enclosures: Yes
- Bike Spaces: 2110

Station Owned and Operated by: Town of Concord

Pass Sales: Yes. La Provence Café – cash, checks, credit cards

Other Transit Connections: No

Concord Outbound Side

Concord Inbound Side

Station: West Concord

Location: Commonwealth and Main St., Concord

Parking: 200

ADA Access: Yes. Mini highs platforms at inbound and outbound sides

Station Amenities:

- Indoor Facilities: Yes. Restaurant "Club Car Café"
- Covered Enclosures: Yes
- Bike Spaces: 10

Station Owned and Operated by: Town of Concord

Pass Sales: Yes. Club Car Café – cash only.

Other Transit Connections: No

West Concord Station Building – Club Car Cafe

West Concord Parking

West Concord Grade Crossing

West Concord Mini high

Station: South Acton

Location: Central St., near Main St., South Acton

Parking: 287 spaces: Commuter - 12 hr. meters; Resident sticker

ADA Access: No

Station Amenities:

- Covered Enclosures: Yes
- Bike Spaces: 44

Station Owned and Operated by: Town of Acton

Pass Sales: No

Other Transit Connections: No

Supplemental Resident Parking

Bike Racks and Lockers

South Acton Platforms

South Acton Parking

Station: Littleton/Rt. 495

Location: Foster St., Littleton

Parking: 65 spaces and 42 spaces in unpaved auxiliary lot

ADA Access: No

Station Amenities:

Covered Enclosures: Yes

Bike Spaces: No

Station Owned and Operated by: MART rents lot from Town of Littleton.

Pass Sales: No

Other Transit Connections: No

Littleton Station

Littleton Parking

Littleton Inbound Train

Station: Ayer

Location: Depot Square, Ayer
Parking: Commuter: 30 spaces
ADA Access: No
Station Amenities:
  Covered Enclosures: Yes
  Bike Spaces: No
Station Owned and Operated by: MART rents lot from Worthingdale Corp.
Pass Sales: Yes. Amy’s Provisions – cash only
Other Transit Connections: No
Development Plans: Planning underway for new 320 car structured parking garage.

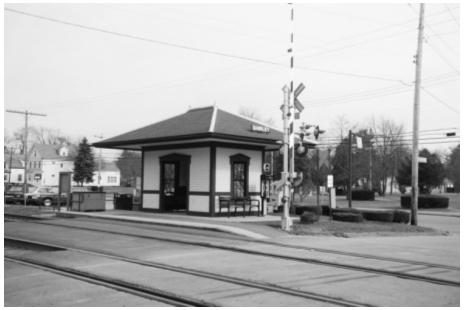
Ayer Station

Ayer Parking

Ayer Station Inbound

Station: Shirley

Location: Main St. and Phoenix St., Shirley
Parking: Ayer St.: 68 spaces; Front St: 20 spaces + 2 dis.
ADA Access: No
Station Amenities:
  Covered Enclosures: Yes
  Bike Spaces: No
Station Owned and Operated by: Town of Shirley. MART pays for lighting at station.
Pass Sales: No
Other Transit Connections: No



Shirley Station

Front St. Parking

Ayer Rd. Parking

Shirley Station Crossover

Station: North Leominster

Location: 568 Main St., North Leominster

Parking: 6 spaces on Prospect St.; additional overflow parking.

ADA Access: No

Station Amenities:

- Covered Enclosures: Yes
- Bike Spaces: No

Station Owned and Operated by: MBTA

Pass Sales: No

Other Transit Connections: No

Development Plans: Station to be relocated. New parking lot with 125 spaces to open August 2004. New station and parking will be located on opposite side of tracks (inbound). New station will owned and operated by MART.

North Leominster Station

North Leominster Parking

Station: Fitchburg

Location: Rt. 2A, Fitchburg
Parking: 60 spaces
ADA Access: Yes
Station Amenities:
- Indoor Facilities: Yes. Ticketing, concessions and restrooms.
- Bike Spaces: 80

Station Owned and Operated by: Montachusetts Regional Transit Authority (MART)
Pass Sales: Yes. MART Intermodal Center – cash only.
Other Transit Connections: MART Bus Routes
Development Plans: New 400 car parking garage to open February 2005.

Fitchburg Station Outbound View

Fitchburg Intermodal Center

Intermodal Center Waiting Area

New Parking Facility Under Construction

Appendix C: Matrix Evaluation

Opportunity	Utilization	Mobility	Cost-Effectiveness	Air Quality	Service Quality	Economic and Land Use Impacts	Environmental Justice	Total
Short-Range								
Consolidate stations	+1	0	+1	0	0	0	0	+2
Eliminate/reduce flag stops	0	-1	0	0	0	0	0	-1
Add sheltered seating	0	0	0	0	+1	0	0	+1
Improve station lighting	0	0	0	0	+1	0	0	+1
Provide bicycle storage	0	0	0	0	+1	0	0	+1
Schedule improvements	+1	0	+1	0	0	0	0	+2
Pass/Ticket Sales	0	0	0	0	+1	0	0	+1
Add continuously welded track	+1	0	-1	0	+1	0	0	+1
Medium-Range								
Reset grade crossing setbacks	+1	0	-1	0	0	0	0	0
Signal system improvements	+1	0	-1	0	+1	0	0	+1
Initiate reverse commute	0	+1	0	0	0	0	+1	+2
Gardner van/bus shuttle	0	+1	0	0	0	0	0	+1
Station improvements	+1	0	0	+1	+1	+1	0	+4
Real-time information	0	0	-1	0	+1	0	0	0
Other infrastructure improvements	0	0	0	0	+1	0	0	+1
Long-Range								
Double Track	+1	0	-1	0	+1	0	0	+1
Additional peak/off peak service	+1	+1	0	+1	+1	0	0	+4
Increased seating capacity	0	0	0	0	+1	0	0	+1
Line extension	0	+1	-1	0	0	+1	0	+1
Expand reverse commute	0	+1	-1	0	0	0	+1	+1
Regional parking facility	+1	0	0	+1	+1	+1	0	+4

Opportunity	Utilization	Mobility	Cost-Effectiveness	Air Quality	Service Quality	Economic and Land Use Impacts	Environmental Justice
Short-Range							
Consolidate stations	Some riders will be lost; however, improvement in travel time should attract new riders. Net benefit in ridership and travel time.	Consolidation of stations in Weston and Belmont may be an inconvenience, but should not be a serious restriction.	Minimal reduction in ridership and accompanying decrease in operating cost.	No impact.	Minimal impact.	No impact.	No impact.
Eliminate/reduce flag stops	Flag stops predominantly in off peak times. May experience some loss of off peak riders, however, loss in ridership is expected to be off set by improvement in travel time.	Elimination of flag stops west of S.Acton (where stations are farther apart) off peak (when large gaps exist between trains) will restrict access.	No impact.	No impact.	No impact.	No impact.	No impact.
Add sheltered seating	No impact.	No impact.	Minimal change in ridership, yet low cost.	No impact.	Will improve passenger comfort.	No impact.	No impact.
Improve station lighting	No impact.	No impact.	Minimal change in ridership, yet low cost.	No impact.	Will improve passenger comfort and safety.	No impact.	No impact.
Provide bicycle storage	No impact.	No impact.	Minimal change in ridership, yet low cost.	No impact.	Will improve interconnectivity of modes.	No impact.	No impact.
Schedule improvements	Will benefit existing riders and attract new riders.	No impact.	Projected increase in ridership and no increase in cost.	Minimal impact.	No impact.	No impact.	No impact.
Pass/Ticket Sales	No impact.	No impact.	Minimal change in ridership, yet low cost.	No impact.	Will be a passenger convenience.	No impact.	No impact.
Add continuously welded track	Will improve travel time.No direct effect on ridership.	No impact.	Minimal change to ridership, yet high cost.	No impact.	Will improve safety and reliability of service on the line.	No impact.	No impact.

Opportunity	Utilization	Mobility	Cost-Effectiveness	Air Quality	Service Quality	Economic and Land Use Impacts	Environmental Justice
Medium-Range							
Reset grade crossing setbacks	Will improve travel time. No direct effect on ridership.	No impact.	Minimal change in ridership, and high cost.	No impact.	No impact.	No impact.	No impact.
Signal system improvements	Will improve travel time. No direct effect on ridership.	No impact.	Minimal change in ridership, and high cost.	No impact.	Will improve safety and service reliability.	No impact.	No impact.
Initiate reverse commute	Projected increase in ridership is low.	Will improve access from Boston to Metro West that is currently unserved.	Minimal change in ridership, yet some moderate cost.	Minimal impact.	No impact.	No impact.	Provides potential for economic benefit to low income residents of Boston.
Gardner van/bus shuttle	Projected increase in ridership is low.	Will provide access from Gardner to Fitchburg and to Boston.	Minimal change in ridership, yet some moderate cost.	Minimal impact.	No impact.	No impact.	No impact.
Station improvements	Increase in parking will increase ridership.	No impact.	Increase in ridership is offset by increase in cost.	Increase in transit ridership and associated reduction in emissions with no increase in locomotive emissions.	Will improve vehicle access to station and passenger convenience.	Will create higher land use purpose and stimulate local economic development.	No impact.
Real-time information	No impact.	No impact.	Minimal change in ridership and high cost.	No impact.	Will improve passenger information.	No impact.	No impact.
Other infrastructure improvements	No impact.	No impact.	Minimal change in ridership and moderate cost.	No impact.	Will improve service reliability.	No impact.	No impact.

Opportunity	Utilization	Mobility	Cost-Effectiveness	Air Quality	Service Quality	Economic and Land Use Impacts	Environmental Justice
Long-Range							
Double Track	Indirect benefit to ridership, will enable more service options that will have a positive impact on ridership. Travel times will be reduced.	No impact.	Minimal change in ridership and large cost.	No impact.	Will improve service reliability.	No impact.	No impact.
Additional peak/off peak service	Will increase ridership.	More off peak service will improve mobility options.	Increase in ridership is offest by high operating and capital costs.	Projected increase in transit ridership, and associated reduction in emissions should outweigh additional locomotive emissions.	Will improve passenger service options.	No impact.	No impact.
Increased seating capacity	No impact.	No impact.	Minimal change in ridership, however low cost.	No impact.	Will reduce overcrowding.	No impact.	No impact.
Line extension	Projected increase in ridership is small.	Will improve access to new area, Gardner, currently unserved by transit.	Small increase in ridership yet high cost.	Reduction in vehicle emissions will be matched by increase in locomotive emissions.	No impact.	Line extension will produce economic benefit to Gardner and area west of Fitchburg.	No impact.
Expand reverse commute	Projected increase in ridership is small.	Will improve access in a new direction that is currently unserved.	Small increase in ridership yet moderate cost (high cost if double tracking is provided).	Reduction in vehicle emissions will be matched by increase in locomotive emissions.	No impact.	No impact.	Provides potential for economic benefit for low income residents of Boston.
Regional parking facility	Large increase in ridership is projected.	No impact.	Large increase ridership is offset by high cost	Projected increase in transit ridership, and associated reduction in emissions with no increase in locomotive emissions.	Will greatly improve vehicle access to stations.	Will serve as a catalyst for economic growth in area.	No impact.

Appendix D: CTPS Documentation

MEMORANDUM

To: **Ron Morgan, MBTA** **December 26, 2004**

From: **Scott Peterson, CTPS**

Re: **Fitchburg Commuter Rail Line Service Expansion Study**

INTRODUCTION

In August of 2001, the MBTA Planning Department began holding public meetings and workshops in Fitchburg to discuss the region's transportation needs as part of its updating of the Program for Mass Transportation (PMT). During a meeting in November of 2001, area legislators used this as a forum for participants to discuss different types of service improvement on the Fitchburg commuter rail line, including service expansion to Washusett and Gardner.

As part of its outreach effort, the MBTA initiated a study to evaluate the ideas received during the public workshops. The study will identify service improvements that could create more travel options for commuter rail riders using the Fitchburg corridor. The MBTA has requested that CTPS provide ridership-forecasting services to the MBTA's consultant who will be performing the study.

The principal objective of this study was to conduct a travel demand analysis and produce ridership forecasts for several alternatives proposed to expanding service on the Fitchburg Commuter Rail Line.

The remainder of this memorandum documents previous research used in this analysis, explains the methodology used in the analysis, describes the assumptions used for each alternative, and finishes with a discussion of the results of the travel demand analysis.

SUPPORTING RESEARCH

The methodology used in this study built used several sources of information, namely from the U.S. Census Bureau, regional planning agencies, and local studies. This section describes the data that was used; demographic forecasts, trip flows between the study area towns, transportation modes of access to work for the these towns, and results of a parking study on five Fitchburg commuter rail line stations.

Demographic Data

The Metropolitan Area Planning Council (MAPC) produced population and employment forecasts that were used as input into the travel demand model. MAPC produced this information for the 2004-2025 Regional Transportation Plan and shows population and employment growth by community for 164 cities and towns within the CTPS model area for

2010 and 2025. The Montachusett Metropolitan Planning Organization (MMPO) developed forecasts for population and employment as part of their 2003 Regional Transportation Plan. Their forecasts are for 22 cities and town and go out to 2010.

Population

- MAPC is expecting the population in cities and towns serving the Fitchburg commuter rail line, excluding Boston, to remain stable to 2010.
- By 2025 these cities and towns are expected to grow by 3.7 percent.
- The MMPO is anticipating an 8% growth in population for the 22 cities and towns in their planning area by 2010.
- Adjusting for the overlap of towns being served by these two planning organizations, the average growth assumed for this corridor in 2010 is 5 percent.

Employment

- MAPC is expecting the employment in cities and towns serving the Fitchburg Commuter Rail Line, excluding Boston to grow by 7 percent for 2010.
- By 2025 these cities and towns are expected to grow by 17 percent.
- The MMPO is anticipating a 7% growth in employment for the 22 cities and towns in their planning area by 2010.
- By 2025 these cities and towns are expected to grow by 12 percent.
- Adjusting for the overlap of towns being served by these two planning organizations that these areas have, the average growth assumed for this corridor in 2010 is 7% and 16 percent for 2025.

Trip Flows

The 2000 U.S. census journey-to-work data was available at the town level and used to determine the distribution of workers along the Fitchburg Commuter Rail corridor as an input into the demand estimates for stations outside of the model area. Thirty-five cities and towns in Boston MPO and MMPO regions were looked at including Boston and Cambridge at the eastern end and Athol on the western end. An analysis of this data showed that there were 135,700 work trips within this corridor, with 46,300 being having destinations in Boston, Cambridge, and Somerville. Over 10,500 people live in Boston and work in a community being served by the Fitchburg Line, with 80 percent of these have destinations east of Concord Station.

Modes of Access

The 2000 U.S. Census Journey-to-work data for mode of access to work was used to help estimate the demand for commuter rail occurring in towns outside the CTPS model area. This showed 120 people using commuter rail in communities, west of Fitchburg. Less than 20 people used the subway. This translates into a mode share for all transit modes of less than 1 percent for these communities while the mode-share for all communities in this study area is 5.7 percent.

Parking

As part of the MAGIC Phase II study, license plate surveys were undertaken at five commuter rail stations on the Fitchburg Line during October and November 2002. The five stations included were:

- Littleton
- South Acton
- West Concord
- Concord
- Lincoln

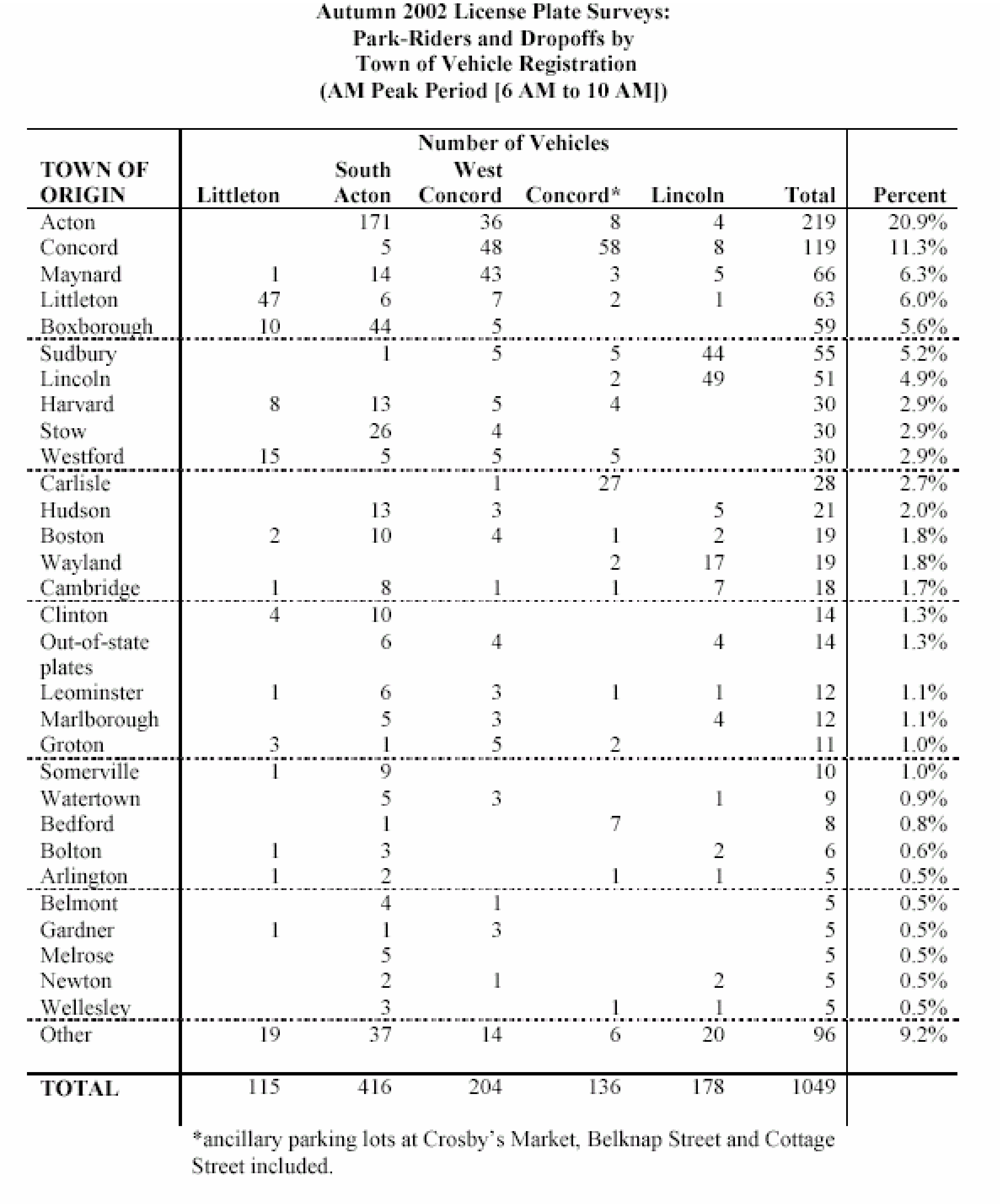
Parking utilization at all stations along the Fitchburg Line, including these five, is at or above capacity. At the request of the MAGIC subregion, CTPS was asked to explore the concept of "shared parking" at existing church or commercial parking lots in the vicinity of the five stations, with possible feeder service via a shuttle system. The license plate surveys were undertaken to update information on the demand characteristics of each of the stations, including the distribution of town origins for both park-and-ride and drop-off commuter rail patrons. The data presented in Table 1 is an example of the type of information that was collected and was used to help estimate parking demand from communities in a parking-constrained scenario.

METHODOLOGY

In this section, a general description of the analytic methods used in estimating the demand for commuter rail ridership and parking is presented. Travel demand was forecast for the 2004, 2010, and 2025 using a set of computer-based, supply-and-demand models in addition to an spreadsheet-elasticity model to account for stations outside of the CTPS model area. These models account for such things as future study area population, downtown employment and travel-time and cost characteristics of the competing highway and transit modes of travel. Results from the computer forecasts provide us with detailed information relating to transit ridership demand. Estimates of passenger boardings at the station level for all transit lines are obtained from the model output.

The travel-demand modeling pivoted off of the "2001 Commuter Rail Parking Demand Analysis" modeling effort and was adjusted to represent 2004 no-build conditions for the stations inside the CTPS model area. The adjustments reflect the increase in demand in the transit system, fare increases, parking availability, and service changes. The travel demand model was used to identify what impact changes in run-time, headways, and station location would have on boardings and alightings at the various stations on the Fitchburg commuter rail line in 2010 and 2025. These impacts were then used to adjust the "2001 Commuter Rail Parking Demand Analysis" forecasts for 2010 and 2025 build alternatives.

Table 1: Distribution of Vehicles Using Fitchburg Commuter Rail Line Stations



Autumn 2002 License Plate Surveys:
Park-Riders and Dropoffs by
Town of Vehicle Registration
(AM Peak Period [6 AM to 10 AM])

TOWN OF ORIGIN	**Number of Vehicles** **Littleton**	**South Acton**	**West Concord**	**Concord***	**Lincoln**	**Total**	**Percent**
Acton		171	36	8	4	219	20.9%
Concord		5	48	58	8	119	11.3%
Maynard	1	14	43	3	5	66	6.3%
Littleton	47	6	7	2	1	63	6.0%
Boxborough	10	44	5			59	5.6%
Sudbury		1	5	5	44	55	5.2%
Lincoln				2	49	51	4.9%
Harvard	8	13	5	4		30	2.9%
Stow		26	4			30	2.9%
Westford	15	5	5	5		30	2.9%
Carlisle			1	27		28	2.7%
Hudson		13	3		5	21	2.0%
Boston	2	10	4	1	2	19	1.8%
Wayland				2	17	19	1.8%
Cambridge	1	8	1	1	7	18	1.7%
Clinton	4	10				14	1.3%
Out-of-state plates		6	4		4	14	1.3%
Leominster	1	6	3	1	1	12	1.1%
Marlborough		5	3		4	12	1.1%
Groton	3	1	5	2		11	1.0%
Somerville	1	9				10	1.0%
Watertown		5	3		1	9	0.9%
Bedford		1		7		8	0.8%
Bolton	1	3			2	6	0.6%
Arlington	1	2		1	1	5	0.5%
Belmont		4	1			5	0.5%
Gardner	1	1	3			5	0.5%
Melrose		5				5	0.5%
Newton		2	1		2	5	0.5%
Wellesley		3		1	1	5	0.5%
Other	19	37	14	6	20	96	9.2%
TOTAL	115	416	204	136	178	1049	

*ancillary parking lots at Crosby's Market, Belknap Street and Cottage Street included.

Source: MAGIC Phase II Study, McShane, 2004

Several towns in the MMPO region were included in the analysis in an off-model approach based on 2000 census journey-to-work data factored up to represent 2004 estimates of current conditions. For the forecast years, the journey-to-work data was "grown" using demographic forecasts produced by the MMPO for 2010 and extrapolated out to 2025. Using estimates of automobile and transit times for the towns outside of the CTPS model area, an elasticity -spreadsheet based model was used to develop demand estimates by mode for each alternative in each forecast year.

Travel-Demand Model Overview

A computer-based set of supply-and-demand models was used as the basis for our ridership and parking-demand forecasts. This set of models was developed at CTPS and has been used extensively over the course of the last several years for a variety of projects. The models are of the same type as those used in most large urban areas in North America. For this project, they were first run and adjusted several times until they replicated the existing highway and transit counts at an acceptable level of accuracy. Then the calibrated model was applied for forecasting using future year model inputs such as the projected population, employment and socioeconomic characteristics; and highway and transit levels of service.

The model set simulates travel on the entire Eastern Massachusetts transit and highway system. As such, it contains all MBTA rail and bus lines and all private express bus carriers. The model contains service frequency (i.e. how often trains and buses arrive at any given transit stop), routing, travel time and fares for all these lines. In the highway system, all of the express highways and principle arterial roadways, and many minor arterial and local roadways are included.

The travel-demand forecasting procedure used in this analysis is based on the traditional four-step, sequential process known as trip generation, trip distribution, mode choice and trip assignment. This process is used to estimate average daily transit ridership, primarily on the basis of forecasts of study area demography and projected level of highway and transit service.

The entire geographic area represented in our model, the Eastern Massachusetts, is divided into several hundred smaller areas known as traffic zones. All calculations are performed at the traffic-zone level. Our model set employs sophisticated and involved techniques in each step of the process. The following sections provide a brief description of the calibration process and explain what each step does.

Steps in Modeling Process

The first model step in the set is a trip-generation model. A projection of the forecast year population was translated; using current trip-generation rates, to estimates of number of daily trips that would be made within each traffic zones in eastern Massachusetts region, namely trip origins. Similarly, projections of employment and development in all the traffic zones were translated, again using trip generation rates, into estimates of number of daily trips that would be made to these zones from all places in eastern Massachusetts, (trips attractions). MAPC and the MMPO furnished population, employment and development projections for the entire eastern Massachusetts region.

The second model is a trip-distribution model. It was used to link the trip origins of all zones with the trip attractions in the CBD and rest of the zones of the entire metro area. The result was a forecast of the total daily trips made between all possible combinations of zones in the metro area, irrespective of travel mode. The output of this model is a trip table, which determines the total demand for transportation in the entire region.

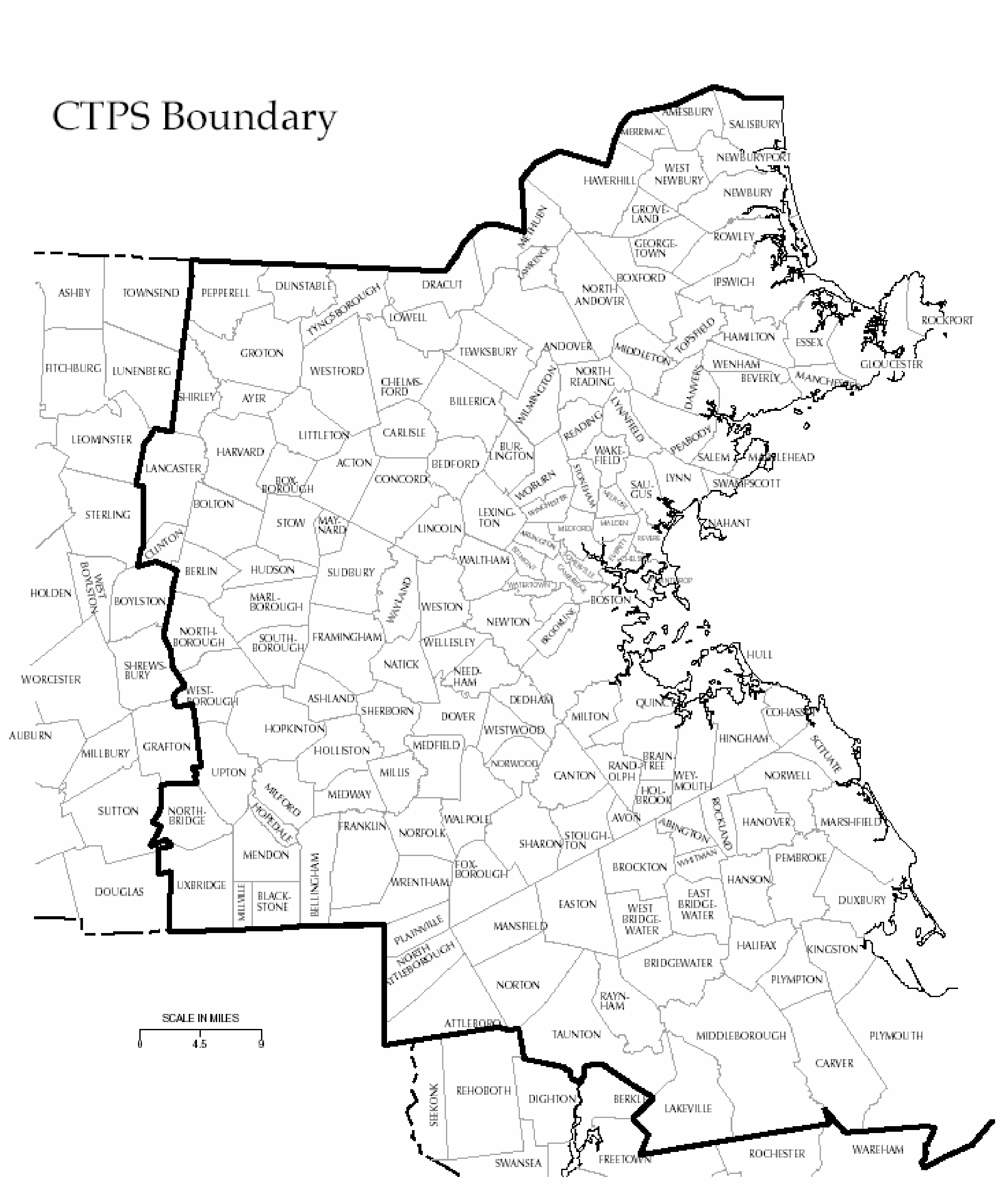
The third model in the model set is a mode-choice model that predicted how many of the daily trips would use transit versus an automobile for the entire trip. In making this forecast, the model considered the travel times and costs of each mode (most of which are derived from a computerized highway and transit network) and certain characteristics of the travelers (whose numbers are estimated in the trip-distribution step), such as the number of automobiles available to their households.

In the final modeling step, transit trip assignment, the transit trips that were forecasted using the mode-choice model were assigned to specific transit lines represented in the network. The output of this final step was an estimation of the daily number transit trips occurring in the forecast year that would be made from the entire eastern Massachusetts region on all transit lines, such as the commuter rail, local bus, express bus, private carriers and the rapid transit lines. The output of the assignment model gives us future estimates of rail and buses boardings at all of the stations in the MBTA system.

In the computerized network portion of the model set, each transit line in the system is represented according to its assumed future-year scheduled frequency, travel time, fare and routing. In addition, parking fees at transit stations are represented. In forecasting, the MBTA's plans for future services such as the Silver Line Phase III project, Old Colony Rail Restoration, and full service to Worcester are embedded in this model. The highway component of the network model represents all interstate highways, major and all minor, arterials and most local roads. Speeds and travel times on these roadways represent forecast year congested peak-period conditions of the forecast year.

In forecasting, it was assumed that the current 2004 MBTA fare structure would continue to exist in 2010 and 2025. Any specific changes in fare policy as indicated by the MBTA were incorporated into the model set. It was further assumed that auto-operating costs would remain the same in real terms at the same rate of inflation. Downtown parking costs were assumed to increase in real terms (i.e. at a higher rate than inflation) due to tighter constraints on parking there. Travel times on the roadway system for both automobiles and buses were projected to increase by the forecast year, as more automobile trips lengthen travel times for everyone.

Figure 1: CTPS Modeled Area



Estimation of Parking Demand

This travel model, passenger boardings at transit stations are estimated by two modes of access: walk access and drive access. The drive-access portion of the boardings data was transformed into estimates the number of parked cars in peak periods by applying a series of factors to them. First, drive-access trips were factored down to account for those who would access stations by kiss-and-ride mode. Next, to transform people into vehicles, auto occupancy for those who would drive and park at a station was assumed and applied. Finally, these daily park-and-ride vehicles were factored to account for turnover, for the number of vehicles using the same parking space during the course of a day. These calculations yielded a forecast of the number of vehicles that would be parked at a given station at the peak time of day.

In the current model set, we have the ability to consider the parking capacity of every park-and-ride lot in the system when estimating the parking demand. The model also allows us to calculate unconstrained parking demand.

Unconstrained versus Constrained Parking Demand

The maximum parking demand at any commuter parking lot is constrained by the available parking capacity. If the parking lot fills up completely at a particular station, then we assume that the unfulfilled demand will be diverted to other down-stream stations that may have excess parking capacity. We also assume that if a station is severely parking-constrained, the access mode share to that station may change in the future, reflecting a higher proportion of drop-offs and carpools compared to the existing conditions.

If parking constraints at a severely constrained location are eased by means of sufficient expansion, the ridership at this location increases. A part of this increase may come from trips diverted from other rail stations and transit modes, and another part may come from increased mode share, that is trips diverted from the automobile mode. Under unconstrained parking conditions, we assume that the percent of drop-offs and carpools would be negligible. Therefore, unconstrained demand is the maximum demand one can expect at a given parking lot if the parking supply at that location is unlimited. The magnitude of unconstrained demand depends on the assumed highway and transit levels of service.

In this analysis we assumed that every parking lot in the transit system would be constrained or unconstrained, not just on the Fitchburg Line.

Model Calibration and Application

Prior to running the model set, market areas were delineated for all the transit stops and rail stations of the entire MBTA system. These are the geographic areas from which most users of each transit stop and rail station would likely come. They were delineated on the basis of detailed information collected from our periodic commuter rail surveys, bus passenger surveys, the 1990 journey-to-work data, existing travel characteristics and expected future transit service configuration in all corridors of the Boston metropolitan region. It was

assumed that, for existing stations, future market areas would be same as the existing market areas.
Using the base year model inputs, travel demand was simulated for all the transit lines. Special attention was given to all the station boardings on the Lowell Line. Calibration of the model was performed so that the simulated boardings were reasonably close to the observed data at the station level. Techniques used in calibration included expanding or limiting access to transit stations and making minor adjustments to the access links connecting zones and transit stations.

Once the calibration was completed, the model was run for the forecast year using future-year inputs such as projected population, employment, highway, and transit system characteristics. Three no-build model runs were performed, one for each year: 2004, 2010, and 2025. The no-build runs serve as a point of reference so as to compare the benefits / dis-benefits associated with the rail extension and improvements to service on the rail line. The output of the model runs provides useful statistics; such as the total daily boardings at the new station, number of trips diverted from the automobile, traffic volumes on the roadways surrounding the new station, and the average mode share for the study area etc.

DESCRIPTION OF NO-BUILD AND BUILD ALTERNATIVES

A no-build and build alternative were modeled for a short-range (2004), medium range (2010), and long-range (2025) timeframe. A description of the assumptions used for the no-build and build alternative follows.

Short-Range

- No-build: 2004 current conditions for the highway and transit network.

- Build: The 2004 no-build highway network was used without any changes. The transit network had several changes made to the Fitchburg commuter rail line and feeder services. These include:

    - Consolidating stations in Weston by eliminating stops at Hastings and Silver Hill
    - Consolidating stations in Belmont by eliminating the stop at Waverly
    - Provide additional service in the peak periods
    - Improve tracks and increase travel speeds
    - Provide shuttle service between Gardner and Fitchburg

    The net result is improved run times for outlying stations, increased headways during the peak periods, and better connectivity to Fitchburg.

Mid-Range

- No-build: 2010 highway and transit network.

- Build: The 2010 highway network was used without any changes. The transit network had several changes made to the Fitchburg commuter rail line and feeder services. These include:

  - Consolidating stations in Weston by eliminating stops at Hastings and Silver Hill
  - Consolidating stations in Belmont by eliminating the stop at Waverly
  - Provide additional service in the peak periods
  - Improve tracks and increase travel speeds
  - Provide shuttle service between Gardner and Fitchburg
  - Improve off-peak train service from North Station to Fitchburg

  The net result is improved run times for outlying stations, increased headways during the peak periods, expanded off-peak service, and better connectivity to Fitchburg.

Long-Range

- No-build: A 2025 highway and transit network from the Regional Transportation Plan.

- Build: The 2025 highway network was used without any changes. The transit network had several changes made to the Fitchburg commuter rail line and feeder services. These include:

  - Consolidating stations in Weston by eliminating stops at Hastings and Silver Hill
  - Consolidating stations in Belmont by eliminating the stop at Waverly
  - Provide additional service in the peak periods
  - Improve tracks and increase travel speeds
  - Provide shuttle service between Gardner and Fitchburg
  - Improve off-peak train service from North Station to Fitchburg
  - Extend commuter rail extension from Fitchburg to Wachusett Station and Gardner
  - Build a regional parking facility near the interchange of I-495 and Rte 2
  - Provide a double track along the entire length of the Fitchburg Line

  The net result is improved run times for outlying stations, increased headways during the peak periods, and better connectivity to points west of Fitchburg.

RESULTS

The results of the travel demand analysis examines the boardings and mode of access shares by line, by station, for each no-build and build alternative.

Fitchburg Line Summary

The results presented in Table 2 show a comparison between the daily boardings for the constrained and the unconstrained parking scenarios for 2004, 2010, and 2025.

Table 2: Daily Boardings on Fitchburg Commuter Rail Line

Year of	Constrained			Unconstrained		
Analysis	**No-build**	**Build**	**Change**	**No-build**	**Build**	**Change**
2004	8,600	8,900	300	10,700	10,920	220
2010	10,880	11,280	400	13,920	14,380	460
2025	12,660	13,420	760	16,980	17,880	900

Source: CTPS, 2004

Short-Range

Improving runtimes for outlying stations along the Fitchburg commuter rail line and improving peak period headways result in between 220 to 300 new daily boardings in the inbound and outbound direction. This shows that the proposed improvements increase boardings between 2 percent with constrained parking demand and 3.5 percent for unconstrained parking demand over the current 2004 no-build conditions. The increase in boardings is due to the improvements in run-time and headway. The difference in boardings between the constrained and unconstrained parking demand may seem counterintuitive at first but the unconstrained parking demand assumption opens up parking opportunities at Alewife Station on the Red Line which siphons demand from the Fitchburg Line, especially after three stations are presumed to be closed in Weston and Belmont.

Mid-Range

Improving run times for outlying stations along the Fitchburg commuter rail line, increases off-peak service, and improving headway result in between 400 to 460 new daily boardings in the inbound and outbound direction. This is an increase of between 3.3 and 3.5 percent in boardings over the forecasted 2010 no-build conditions. The scenario that assumed constrained parking conditions generates the 380 boardings, while the unconstrained has 470. This shows that the unconstrained parking is showing more growth in the outlying stations (West of Rte 128) than is being diverted to Alewife Station due to the closed stations. This increase appears to be mainly due to improvements in run time and headways that were also factors in the short-term improvement scenarios.

Long-Range

Improving run-times for outlying stations along the Fitchburg commuter rail line, off–peak service, improving headway, and adding 3 new station result in between 760 and 900 new daily boardings in the inbound and outbound direction. This is an increase of between 5 and 6 percent in boardings over the forecasted 2025 no-build conditions. The increase in growth at outlying stations, along with the improved service to them, and worsening roadway congestion along Rte 2 all contribute to this increase and make Alewife less of an option for drive access trips using Route 2.

A summary of station boardings and alighting for each time period, year, and alternative is presented in Appendix A.

Summary of Station Access Mode

The results in Table 3 show a comparison between the modes of access in the constrained with the unconstrained parking scenarios ones for 2004, 2010, and 2025. The modes of access accounted for in this table are walk, drive and kiss-and-ride (KNR).

Table 3: Percent Mode Share Based on Access

Year of	**Constrained**			**Unconstrained**		
Analysis	**No-build**	**Build**	**Change**	**No-build**	**Build**	**Change**
2004	100%	100%		100%	100%	
Walk	49%	49%	0%	40%	40%	0%
Drive	33%	32%	-1%	46%	45%	-1%
Kiss-and-ride	18%	19%	1%	14%	15%	1%
2010	100%	100%		100%	100%	
Walk	50%	52%	2%	39%	41%	2%
Drive	30%	28%	-2%	45%	43%	-2%
Kiss-and-ride	20%	20%	0%	16%	16%	0%
2025	100%	100%		100%	100%	
Walk	49%	46%	3%	37%	36%	2%
Drive	28%	29%	-1%	46%	45%	0%
Kiss-and-ride	23%	25%	2%	17%	19%	2%

Source: CTPS, 2004

Short-Range

In the parking-constrained scenario, the walk mode accounts for almost 50 percent of all people accessing the station. The drive access shares account for 33 percent while KNR is about 19 percent. The build alternative shifts more people to kiss-and-ride option and reduce the drive access share. The walk access percentage remains unchanged.

In the unconstrained parking scenario, 40 percent use the walk mode, the drive mode increases to 46 percent, and KNR reduces to 14 percent . The build alternative increases walk shares. The drive shares reduce slightly due to closing three transit stations along the line, which reduce parking options. This causes people to divert to other commuter rail stations or Alewife Station. KNR shares increase slightly due to these diversions.

Mid-Range

The parking constrained scenario for 2010 again shows the walk mode accounting for almost 50 percent of all people accessing the station. The drive access shares reduce from 33 percent to 30 percent while KNR increase to 20 percent. The build alternative shifts more people to the walk mode and reduce the drive access shares. The KNR access percentage remains unchanged.

In the unconstrained parking scenario 39 percent use the walk mode, drive increases to 45 percent, and KNR reduces to 16 percent. The build alternative increases walk shares to 41 percent. The drive shares reduce slightly while KNR shares remain unchanged.

Long-Range

The parking constrained scenario for 2025 again shows the walk mode accounting for almost 49 percent of all people accessing the station. The drive access shares reduce from 30 percent in 2010 to 28 percent in 2025. The KNR increases from 20 percent in 2010 to 23 percent in 2025. The build alternative for this scenario shifts more people to drive mode and KNR, mainly due to the new stations at the terminus of the line and the Regional Rte 2 / I-495 station. The walk access percentage reduces to 46 percent.

The unconstrained parking scenario has 37 percent using the walk mode, drive has 46 percent, and KNR reduces to 17 percent. The build alternative decreases walk shares slightly to 35 percent. The drive shares reduce slightly while KNR increases from 17 percent to 19 percent.

The forecasted increase in demand due to the build alternatives (760 to 840 boardings) shows that parking constraint is not an important variable in determining the demand for outlying stations.

List of Tables

Table	Year	Scenario	Ridership Summary	Parking Assumption
A-1	2004	No-build:	inbound boardings and alightings,	parking constrained
A-2	2004	Short-range:	inbound boardings and alightings,	parking constrained
A-3	2004	No-build:	outbound boardings and alightings,	parking constrained
A-4	2004	Short-range:	outbound boardings and alightings,	parking constrained
A-5	2004	No-build:	total boardings and alightings,	parking constrained
A-6	2004	Short-range:	total boardings and alightings,	parking constrained
A-7	2004	No-build:	inbound boardings and alightings,	unconstrained parking
A-8	2004	Short-range:	inbound boardings and alightings,	unconstrained parking
A-9	2004	No-build:	outbound boardings and alightings,	unconstrained parking
A-10	2004	Short-range:	outbound boardings and alightings,	unconstrained parking
A-11	2004	No-build:	total boardings and alightings,	unconstrained parking
A-12	2004	Short-range:	total boardings and alightings,	unconstrained parking
A-13	2010	No-build:	inbound boardings and alightings,	parking constrained
A-14	2010	Medium-range:	inbound boardings and alightings,	parking constrained
A-15	2010	No-build:	outbound boardings and alightings,	parking constrained
A-16	2010	Medium-range:	outbound boardings and alightings,	parking constrained
A-17	2010	No-build:	total boardings and alightings,	parking constrained
A-18	2010	Medium-range:	total boardings and alightings,	parking constrained
A-19	2010	No-build:	inbound boardings and alightings,	unconstrained parking
A-20	2010	Medium-range:	inbound boardings and alightings,	unconstrained parking
A-21	2010	No-build:	outbound boardings and alightings,	unconstrained parking
A-22	2010	Medium-range:	outbound boardings and alightings,	unconstrained parking
A-23	2010	No-build:	total boardings and alightings,	unconstrained parking
A-24	2010	Medium-range:	total boardings and alightings,	unconstrained parking
A-25	2025	No-build:	inbound boardings and alightings,	parking constrained
A-26	2025	Long-range:	inbound boardings and alightings,	parking constrained
A-27	2025	No-build:	outbound boardings and alightings,	parking constrained
A-28	2025	Long-range:	outbound boardings and alightings,	parking constrained
A-29	2025	No-build:	total boardings and alightings,	parking constrained
A-30	2025	Long-range:	total boardings and alightings,	parking constrained
A-31	2025	No-build:	inbound boardings and alightings,	unconstrained parking
A-32	2025	Long-range:	inbound boardings and alightings,	unconstrained parking
A-33	2025	No-build:	outbound boardings and alightings,	unconstrained parking
A-34	2025	Long-range:	outbound boardings and alightings,	unconstrained parking
A-35	2025	No-build:	total boardings and alightings,	unconstrained parking
A-36	2025	Long-range:	total boardings, and alightings	unconstrained parking

🟩 Boardings ⬜ Alightings 🟧 Station not operational

A-1
2004 No-Build: Inbound Boardings & Alightings, Constrained

	AM		MD		PM		NT		Daily	
Station	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**
North Station	-	1,920	-	400	-	220	-	260	-	2,800
Porter Square	40	870	60	170	30	90	10	120	140	1,250
Belmont	100	10	20	-	10	10	10	-	140	20
Waverly	90	20	20	-	10	-	10	-	130	20
Waltham	350	40	70	10	40	10	40	10	500	70
Brandeis/Roberts	340	40	60	20	40	10	50	10	490	80
Kendall Green	90	-	20	-	10	-	10	-	130	-
Hastings	40	-	10	-	-	-	-	-	50	-
Silver Hill	10	-	-	-	-	-	10	-	20	-
Lincoln	220	10	40	-	20	-	30	-	310	10
Concord	300	20	60	10	30	-	40	-	430	30
West Concord	290	10	50	-	30	-	50	-	420	10
South Acton	380	10	70	-	40	-	50	-	540	10
Littleton	120	-	20	-	10	-	20	-	170	-
Regional Station I										
Ayer	170	-	30	-	20	-	20	-	240	-
Regional Station II										
Shirley	90	-	20	-	10	-	10	-	130	-
North Leominister	140	-	30	-	20	-	10	-	200	-
Fitchburg	180	-	30	-	20	-	30	-	260	-
Wachusett										
Gardner										
Total	**2,950**	**2,950**	**610**	**610**	**340**	**340**	**400**	**400**	**4,300**	**4,300**
% of Daily Total	**69%**	**69%**	**14%**	**14%**	**8%**	**8%**	**9%**	**9%**	**100%**	**100%**

A-2
2004 Short-range: Inbound Boardings & Alightings, Constrained

	AM		MD		PM		NT		Daily	
Station	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**
North Station	-	1,920	-	400	-	220	-	260	-	2,800
Porter Square	40	870	60	170	30	90	10	120	140	1,250
Belmont	100	10	20	-	10	10	10	-	140	20
Waverly	90	20	20	-	10	-	10	-	130	20
Waltham	350	40	70	10	40	10	40	10	500	70
Brandeis/Roberts	340	40	60	20	40	10	50	10	490	80
Kendall Green	90	-	20	-	10	-	10	-	130	-
Hastings	40	-	10	-	-	-	-	-	50	-
Silver Hill	10	-	-	-	-	-	10	-	20	-
Lincoln	220	10	40	-	20	-	30	-	310	10
Concord	300	20	60	10	30	-	40	-	430	30
West Concord	290	10	50	-	30	-	50	-	420	10
South Acton	380	10	70	-	40	-	50	-	540	10
Littleton	120	-	20	-	10	-	20	-	170	-
Regional I										
Ayer	170	-	30	-	20	-	20	-	240	-
Regional II										
Shirley	90	-	20	-	10	-	10	-	130	-
North Leominister	140	-	30	-	20	-	10	-	200	-
Fitchburg	180	-	30	-	20	-	30	-	260	-
Wachusett										
Gardner										
Total	**2,950**	**2,950**	**610**	**610**	**340**	**340**	**400**	**400**	**4,300**	**4,300**
% of Daily Total	**69%**	**69%**	**14%**	**14%**	**8%**	**8%**	**9%**	**9%**	**100%**	**100%**

A-3

2004 No-Build: Outbound Boardings & Alightings, Constrained

	AM		MD		PM		NT		Daily	
Station	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**
North Station	210	-	240	-	1,720	-	630	-	2,800	-
Porter Square	90	20	110	20	770	90	280	40	1,250	140
Belmont	-	10	-	10	10	90	10	30	20	140
Waverly	-	10	-	10	10	80	10	30	20	130
Waltham	10	40	10	40	40	310	10	110	70	500
Brandeis/Roberts	10	40	10	40	50	300	10	110	80	490
Kendall Green	-	10	-	10	-	80	-	30	-	130
Hastings	-	-	-	-	-	30	-	10	-	50
Silver Hill	-	-	-	-	-	10	-	-	-	20
Lincoln	-	20	-	30	10	190	-	70	10	310
Concord	-	30	-	40	20	270	10	100	30	430
West Concord	-	30	-	40	10	260	-	90	10	420
South Acton	-	40	-	50	10	330	-	120	10	540
Littleton	-	10	-	10	-	100	-	40	-	170
Regional I									-	-
Ayer	-	20	-	20	-	150	-	50	-	240
Regional II									-	-
Shirley	-	10	-	10	-	80	-	30	-	130
North Leominister	-	10	-	20	-	120	-	40	-	200
Fitchburg	-	20	-	20	-	160	-	60	-	260
Wachusett										
Gardner										
Total	**320**	**320**	**370**	**370**	**2,650**	**2,650**	**960**	**960**	**4,300**	**4,300**
% of Daily Total	**7%**	**7%**	**9%**	**9%**	**62%**	**62%**	**22%**	**22%**	**100%**	**100%**

A-4
2004 Short-range: Outbound Boardings & Alightings, Constrained

	AM		**MD**		**PM**		**NT**		**Daily**	
Station	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**
North Station	220	-	250	-	1,780	-	650	-	2,900	-
Porter Square	100	40	110	-	810	90	300	40	1,320	150
Belmont	-	10	-	20	10	120	-	40	10	190
Waverly										
Waltham	10	40	10	50	40	340	10	120	70	550
Brandeis/Roberts	10	40	10	50	60	340	10	120	90	550
Kendall Green	-	10	-	10	-	90	-	30	-	140
Hastings										
Silver Hill										
Lincoln	-	20	-	30	10	200	-	70	10	330
Concord	-	30	-	40	20	270	10	100	30	440
West Concord	-	30	-	40	10	270	-	100	10	430
South Acton	-	40	-	50	10	330	-	120	10	540
Littleton	-	10	-	20	-	120	-	40	-	190
Regional I									-	-
Ayer	-	20	-	20	-	160	-	60	-	260
Regional II									-	-
Shirley	-	10	-	10	-	90	-	30	-	150
North Leominister	-	20	-	20	-	150	-	50	-	240
Fitchburg	-	20	-	20	-	180	-	60	-	290
Wachusett										
Gardner										
Total	**340**	**340**	**380**	**380**	**2,750**	**2,750**	**980**	**980**	**4,450**	**4,450**
% of Daily Total	**8%**	**8%**	**9%**	**9%**	**62%**	**62%**	**22%**	**22%**	**100%**	**100%**

A-5

2004 No-Build: Total Boardings & Alightings, Constrained

	AM		**MD**		**PM**		**NT**		**Daily**	
Station	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**
North Station	210	1,920	240	400	1,720	220	630	260	2,800	2,800
Porter Square	130	890	170	190	800	180	290	160	1,390	1,420
Belmont	100	20	20	10	20	100	20	30	160	160
Waverly	90	30	20	10	20	80	20	30	150	150
Waltham	360	80	80	50	80	320	50	120	570	570
Brandeis/Roberts	350	80	70	60	90	310	60	120	570	570
Kendall Green	90	10	20	10	10	80	10	30	130	130
Hastings	40	-	10	-	-	30	-	10	50	40
Silver Hill	10	-	-	-	-	10	10	-	20	10
Lincoln	220	30	40	30	30	190	30	70	320	320
Concord	300	50	60	50	50	270	50	100	460	470
West Concord	290	40	50	40	40	260	50	90	430	430
South Acton	380	50	70	50	50	330	50	120	550	550
Littleton	120	10	20	10	10	100	20	40	170	160
Regional I										
Ayer	170	20	30	20	20	150	20	50	240	240
Regional II										
Shirley	90	10	20	10	10	80	10	30	130	130
North Leominister	140	10	30	20	20	120	10	40	200	190
Fitchburg	180	20	30	20	20	160	30	60	260	260
Wachusett										
Gardner										
Total	**3,270**	**3,270**	**980**	**980**	**2,990**	**2,990**	**1,360**	**1,360**	**8,600**	**8,600**
% of Daily Total	**38%**	**38%**	**11%**	**11%**	**35%**	**35%**	**16%**	**16%**	**100%**	**100%**

A-6
2004 Short-range: Total Boardings & Alightings, Constrained

	AM		MD		PM		NT		Daily	
Station	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**
North Station	220	2,000	250	400	1,780	240	650	260	2,900	2,900
Porter Square	150	970	170	170	840	190	310	160	1,470	1,490
Belmont	130	20	20	20	30	120	20	40	200	200
Waverly										
Waltham	400	80	80	60	80	350	60	130	620	620
Brandeis/Roberts	400	80	80	70	100	360	60	130	640	640
Kendall Green	100	10	20	10	10	90	10	30	140	140
Hastings										
Silver Hill										
Lincoln	230	30	40	30	40	200	30	70	340	330
Concord	310	50	60	50	60	270	40	100	470	470
West Concord	300	40	60	40	40	270	40	100	440	450
South Acton	380	50	70	50	50	330	50	120	550	550
Littleton	130	10	20	20	20	120	20	40	190	190
Regional I										
Ayer	180	20	30	20	20	160	30	60	260	260
Regional II										
Shirley	110	10	20	10	10	90	10	30	150	140
North Leominister	170	20	30	20	20	150	20	50	240	240
Fitchburg	200	20	40	20	20	180	30	60	290	280
Wachusett										
Gardner										
Total	**3,410**	**3,410**	**990**	**990**	**3,120**	**3,120**	**1,380**	**1,380**	**8,900**	**8,900**
% of Daily Total	**38%**	**38%**	**11%**	**11%**	**35%**	**35%**	**16%**	**16%**	**100%**	**100%**

A-7
2004 No-Build: Inbound Boardings & Alightings, Unconstrained

	AM		MD		PM		NT		Daily	
Station	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**
North Station	-	2,410	-	490	-	290	-	290	-	3,480
Porter Square	40	1,100	60	210	30	130	10	130	140	1,570
Belmont	110	20	20	-	10	-	10	-	150	20
Waverly	90	30	20	10	10	-	10	-	130	40
Waltham	420	50	80	10	50	10	50	10	600	80
Brandeis/Roberts	410	50	80	20	50	20	50	20	590	110
Kendall Green	110	-	20	-	10	-	10	-	150	-
Hastings	40	-	10	-	-	-	-	-	50	-
Silver Hill	10	-	-	-	-	-	10	-	20	-
Lincoln	290	-	50	-	30	-	40	-	410	-
Concord	410	30	80	10	50	-	40	-	580	40
West Concord	420	10	80	-	50	-	50	-	600	10
South Acton	520	-	100	-	60	-	60	-	740	-
Littleton	140	-	30	-	20	-	10	-	200	-
Regional I										
Ayer	180	-	30	-	20	-	30	-	260	-
Regional II										
Shirley	130	-	20	-	10	-	20	-	180	-
North Leominister	160	-	30	-	20	-	20	-	230	-
Fitchburg	220	-	40	-	30	-	30	-	320	-
Wachusett										
Gardner										
Total	**3,700**	**3,700**	**750**	**750**	**450**	**450**	**450**	**450**	**5,350**	**5,350**
% of Daily Total	**69%**	**69%**	**14%**	**14%**	**8%**	**8%**	**8%**	**8%**	**100%**	**100%**

A-8

2004 Short-range: Inbound Boardings & Alightings, Unconstrained

	AM		MD		PM		NT		Daily	
Station	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**
North Station	-	2,460	-	500	-	300	-	290	-	3,550
Porter Square	50	1,150	60	210	30	130	10	130	150	1,620
Belmont	140	20	30	-	20	-	10	-	200	20
Waverly										
Waltham	420	50	80	10	50	10	50	10	600	80
Brandeis/Roberts	390	50	70	40	40	20	50	20	550	130
Kendall Green	110	-	20	-	10	-	20	-	160	-
Hastings										
Silver Hill										
Lincoln	310	10	60	-	40	-	30	-	440	10
Concord	430	30	80	10	50	-	50	-	610	40
West Concord	440	10	80	-	50	-	60	-	630	10
South Acton	520	-	100	-	60	-	60	-	740	-
Littleton	160	-	30	-	20	-	20	-	230	-
Regional I										
Ayer	200	-	40	-	20	-	30	-	290	-
Regional II										
Shirley	150	-	30	-	20	-	10	-	210	-
North Leominister	200	-	40	-	20	-	20	-	280	-
Fitchburg	260	-	50	-	30	-	30	-	370	-
Wachusett										
Gardner										
Total	**3,780**	**3,780**	**770**	**770**	**460**	**460**	**450**	**450**	**5,460**	**5,460**
% of Daily Total	**69%**	**69%**	**14%**	**14%**	**8%**	**8%**	**8%**	**8%**	**100%**	**100%**

A-9

2004 No-Build: Outbound Boardings & Alightings, Unconstrained

	AM		MD		PM		NT		Daily	
Station	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**
North Station	260	-	300	-	2,140	-	780	-	3,480	-
Porter Square	120	40	130	20	970	90	350	40	1,570	140
Belmont	-	10	-	10	10	90	10	30	20	150
Waverly	-	10	-	10	20	80	20	30	40	130
Waltham	10	40	10	50	50	370	10	140	80	600
Brandeis/Roberts	10	40	10	50	70	360	20	130	110	590
Kendall Green	-	10	-	10	-	90	-	30	-	150
Hastings	-	-	-	-	-	30	-	10	-	50
Silver Hill	-	-	-	-	-	10	-	-	-	20
Lincoln	-	30	-	30	-	250	-	90	-	410
Concord	-	40	-	50	20	360	20	130	40	580
West Concord	-	40	-	50	10	370	-	140	10	600
South Acton	-	60	-	60	-	460	-	170	-	740
Littleton	-	10	-	20	-	120	-	50	-	200
Regional I									-	-
Ayer	-	20	-	20	-	160	-	60	-	260
Regional II									-	-
Shirley	-	10	-	20	-	110	-	40	-	180
North Leominister	-	20	-	20	-	140	-	50	-	230
Fitchburg	-	20	-	30	-	200	-	70	-	320
Wachusett										
Gardner										
Total	**400**	**400**	**450**	**450**	**3,290**	**3,290**	**1,210**	**1,210**	**5,350**	**5,350**
% of Daily Total	**7%**	**7%**	**8%**	**8%**	**61%**	**61%**	**23%**	**23%**	**100%**	**100%**

A-10

2004 Short-range: Outbound Boardings & Alightings, Unconstrained

	AM		MD		PM		NT		Daily	
Station	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**
North Station	270	-	300	-	2,180	-	800	-	3,550	-
Porter Square	120	10	140	20	1,000	80	360	20	1,620	150
Belmont	-	10	-	20	10	120	10	50	20	200
Waverly										
Waltham	10	40	10	50	50	370	10	140	80	600
Brandeis/Roberts	10	40	10	50	80	340	30	120	130	550
Kendall Green	-	10	-	10	-	100	-	40	-	160
Hastings										
Silver Hill										
Lincoln	-	30	-	40	10	270	-	100	10	440
Concord	-	50	-	50	20	380	20	140	40	610
West Concord	-	50	-	50	10	390	-	140	10	630
South Acton	-	60	-	60	-	460	-	170	-	740
Littleton	-	20	-	20	-	140	-	50	-	230
Regional I									-	-
Ayer	-	20	-	20	-	180	-	70	-	290
Regional II									-	-
Shirley	-	20	-	20	-	130	-	50	-	210
North Leominister	-	20	-	20	-	170	-	60	-	280
Fitchburg	-	30	-	30	-	230	-	80	-	370
Wachusett										
Gardner										
Total	**410**	**410**	**460**	**460**	**3,360**	**3,360**	**1,230**	**1,230**	**5,460**	**5,460**
% of Daily Total	**8%**	**8%**	**8%**	**8%**	**62%**	**62%**	**23%**	**23%**	**100%**	**100%**

A-11
2004 No-Build: Total Boardings & Alightings, Unconstrained

	AM		MD		PM		NT		Daily	
Station	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**
North Station	260	2,410	300	490	2,140	290	780	290	3,480	3,480
Porter Square	160	1,140	190	230	1,000	220	360	170	1,710	1,760
Belmont	110	30	20	10	20	90	20	30	170	160
Waverly	90	40	20	20	30	80	30	30	170	170
Waltham	430	90	90	60	100	380	60	150	680	680
Brandeis/Roberts	420	90	90	70	120	380	70	150	700	690
Kendall Green	110	10	20	10	10	90	10	30	150	140
Hastings	40	-	10	-	-	30	-	10	50	40
Silver Hill	10	-	-	-	-	10	10	-	20	10
Lincoln	290	30	50	30	30	250	40	90	410	400
Concord	410	70	80	60	70	360	60	130	620	620
West Concord	420	50	80	50	60	370	50	140	610	610
South Acton	520	60	100	60	60	460	60	170	740	750
Littleton	140	10	30	20	20	120	10	50	200	200
Regional I										
Ayer	180	20	30	20	20	160	30	60	260	260
Regional II										
Shirley	130	10	20	20	10	110	20	40	180	180
North Leominister	160	20	30	20	20	140	20	50	230	230
Fitchburg	220	20	40	30	30	200	30	70	320	320
Wachusett										
Gardner										
Total	**4,100**	**4,100**	**1,200**	**1,200**	**3,740**	**3,740**	**1,660**	**1,660**	**10,700**	**10,700**
% of Daily Total	**38%**	**38%**	**11%**	**11%**	**35%**	**35%**	**16%**	**16%**	**100%**	**100%**

A-12

2004 Short-range: Total Boardings & Alightings, Unconstrained

	AM		MD		PM		NT		Daily	
Station	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**
North Station	270	2,460	300	500	2,180	300	800	290	3,550	3,550
Porter Square	170	1,160	200	230	1,030	210	370	150	1,770	1,750
Belmont	140	30	30	20	30	120	20	50	220	220
Waverly										
Waltham	430	90	90	60	100	380	60	150	680	680
Brandeis/Roberts	400	90	80	90	120	360	80	140	680	680
Kendall Green	110	10	20	10	10	100	20	40	160	160
Hastings										
Silver Hill										
Lincoln	310	40	60	40	50	270	30	100	450	450
Concord	430	80	80	60	70	380	70	140	650	660
West Concord	440	60	80	50	60	390	60	140	640	640
South Acton	520	60	100	60	60	460	60	170	740	750
Littleton	160	20	30	20	20	140	20	50	230	230
Regional I										
Ayer	200	20	40	20	20	180	30	70	290	290
Regional II										
Shirley	150	20	30	20	20	130	10	50	210	220
North Leominister	200	20	40	20	20	170	20	60	280	270
Fitchburg	260	30	50	30	30	230	30	80	370	370
Wachusett										
Gardner										
Total	**4,190**	**4,190**	**1,230**	**1,230**	**3,820**	**3,820**	**1,680**	**1,680**	**10,920**	**10,920**
% of Daily Total	**38%**	**38%**	**11%**	**11%**	**35%**	**35%**	**15%**	**15%**	**100%**	**100%**

Table A-13
2010 No-Build: Inbound Boardings & Alightings, Constrained

	AM		MD		PM		NT		Daily	
Station	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**
North Station	350	3,270	400	630	2,880	380	1,050	400	4,680	4,680
Porter Square	220	1,470	250	290	1,330	270	480	200	2,280	2,230
Belmont	190	70	40	20	40	170	30	60	300	320
Waverly										
Waltham	580	130	120	100	150	520	100	200	950	950
Brandeis/Roberts	690	160	140	130	200	620	120	240	1,150	1,150
Kendall Green	130	10	20	20	20	120	20	40	190	190
Hastings										
Silver Hill										
Lincoln	390	50	70	60	50	340	60	130	570	580
Concord	530	60	100	70	80	470	70	170	780	770
West Concord	510	60	90	60	70	450	70	170	740	740
South Acton	640	80	120	80	80	560	80	210	920	930
Littleton	270	30	50	30	30	240	40	90	390	390
Regional I										
Ayer										
Regional II	430	50	80	50	50	380	30	140	590	620
Shirley										
North Leominister	230	20	40	30	30	200	30	80	330	330
Fitchburg	350	40	70	40	40	310	40	110	500	500
Wachusett										
Gardner										
Total	**5,510**	**5,500**	**1,590**	**1,610**	**5,050**	**5,030**	**2,220**	**2,240**	**14,370**	**14,380**
% of Daily Total	**40%**	**40%**	**11%**	**12%**	**36%**	**36%**	**16%**	**16%**	**100%**	**100%**

Table A-14
2010 Medium-range: Inbound Boardings & Alightings, Constrained

	AM		**MD**		**PM**		**NT**		**Daily**	
Station	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**
North Station	-	2,540	-	510	-	310	-	300	-	3,660
Porter Square	60	1,140	70	210	40	130	20	150	190	1,630
Belmont	180	20	30	-	20	-	20	-	250	20
Waverly										
Waltham	470	50	90	20	50	10	60	10	670	90
Brandeis/Roberts	550	60	100	40	60	20	80	30	790	150
Kendall Green	100	-	20	-	10	-	10	-	140	-
Hastings										
Silver Hill										
Lincoln	270	10	50	-	30	-	40	-	390	10
Concord	390	30	70	10	40	-	50	10	550	50
West Concord	330	10	60	-	40	-	40	10	470	20
South Acton	460	10	90	-	50	-	60	-	660	10
Littleton	220	-	40	-	30	-	30	-	320	-
Regional I										
Ayer										
Regional II	360	-	70	-	40	-	*30*	-	*520*	-
Shirley										
North Leominister	200	-	40	-	20	-	30	-	290	-
Fitchburg	280	-	50	-	30	-	40	-	400	-
Wachusett										
Gardner										
Total	**3,870**	**3,870**	**780**	**790**	**460**	**470**	**510**	**510**	**5,640**	**5,640**
% of Daily Total	**69%**	**69%**	**14%**	**14%**	**8%**	**8%**	**9%**	**9%**	**100%**	**100%**

Table A-15
2010 No-Build: Outbound Boardings & Alightings, Constrained

	AM		MD		PM		NT		Daily	
Station	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**
North Station	270	-	300	-	2,180	-	790	-	3,540	-
Porter Square	120	10	130	30	970	120	360	30	1,580	190
Belmont	-	20	-	20	10	120	10	40	20	200
Waverly	-	10	-	10	20	90	10	30	30	150
Waltham	10	40	10	50	60	360	10	130	90	590
Brandeis/Roberts	10	60	10	60	70	460	20	170	110	740
Kendall Green	-	10	-	10	-	70	-	30	-	120
Hastings	-	-	-	-	-	40	-	10	-	60
Silver Hill	-	-	-	-	-	20	-	10	-	30
Lincoln	-	30	-	30	10	220	-	80	10	350
Concord	-	40	-	40	20	330	20	120	40	540
West Concord	-	40	-	40	10	290	-	110	10	470
South Acton	-	50	-	50	10	410	-	150	10	660
Littleton	-	20	-	20	-	190	-	70	-	300
Regional I										
Ayer										
Regional II	*-*	*30*	*-*	*40*	*-*	*270*	*-*	*100*	*-*	*440*
Shirley										
North Leominister	-	20	-	20	-	150	-	60	-	250
Fitchburg	-	30	-	30	-	220	-	80	-	350
Wachusett										
Gardner										
Total	**410**	**410**	**450**	**450**	**3,360**	**3,360**	**1,220**	**1,220**	**5,440**	**5,440**
% of Daily Total	**8%**	**8%**	**8%**	**8%**	**62%**	**62%**	**22%**	**22%**	**100%**	**100%**

Table A-16
2010 Medium-range: Outbound Boardings & Alightings, Constrained

	AM		MD		PM		NT		Daily	
Station	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**
North Station	270	-	310	-	2,250	-	830	-	3,660	-
Porter Square	120	-	140	20	1,000	100	370	50	1,630	190
Belmont	-	20	-	20	10	150	10	60	20	250
Waverly										
Waltham	10	50	10	60	60	410	10	150	90	670
Brandeis/Roberts	10	60	10	70	90	490	40	180	150	790
Kendall Green	-	10	-	10	-	90	-	30	-	140
Hastings										
Silver Hill										
Lincoln	-	30	-	30	10	240	-	90	10	390
Concord	-	40	-	50	30	340	20	120	50	550
West Concord	-	40	-	40	10	290	10	110	20	470
South Acton	-	50	-	50	10	410	-	150	10	660
Littleton	-	20	-	30	-	200	-	70	-	320
Regional I										
Ayer										
Regional II	-	*40*	-	*40*	-	*320*	-	*120*	-	*520*
Shirley										
North Leominister	-	20	-	20	-	180	-	70	-	290
Fitchburg	-	30	-	30	-	250	-	90	-	400
Wachusett										
Gardner										
Total	**410**	**410**	**470**	**470**	**3,470**	**3,470**	**1,290**	**1,290**	**5,640**	**5,640**
% of Daily Total	**7%**	**7%**	**8%**	**8%**	**62%**	**62%**	**23%**	**23%**	**100%**	**100%**

Table A-17
2010 No-Build: Total Boardings & Alightings, Constrained

	AM		MD		PM		NT		Daily	
Station	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**
North Station	270	2,440	300	510	2,180	300	790	290	3,540	3,540
Porter Square	180	1,120	210	240	1,010	250	370	160	1,770	1,770
Belmont	140	40	30	20	30	120	20	40	220	220
Waverly	110	30	20	20	30	90	20	30	180	170
Waltham	420	90	90	70	110	370	60	140	680	670
Brandeis/Roberts	530	110	110	90	130	480	80	180	850	860
Kendall Green	80	10	20	10	10	70	10	30	120	120
Hastings	40	-	10	-	-	40	10	10	60	50
Silver Hill	20	-	-	-	-	20	10	10	30	30
Lincoln	250	40	50	30	40	220	20	80	360	370
Concord	380	70	70	50	60	330	70	120	580	570
West Concord	330	50	60	40	50	290	40	110	480	490
South Acton	460	60	90	50	60	410	60	150	670	670
Littleton	210	20	40	20	20	190	30	70	300	300
Regional I										
Ayer										
Regional II	310	30	60	40	40	270	30	100	440	440
Shirley										
North Leominister	180	20	30	20	20	150	20	60	250	250
Fitchburg	250	30	50	30	30	220	20	80	350	360
Wachusett										
Gardner										
Total	**4,160**	**4,160**	**1,240**	**1,240**	**3,820**	**3,820**	**1,660**	**1,660**	**10,880**	**10,880**
% of Daily Total	**38%**	**38%**	**11%**	**11%**	**35%**	**35%**	**15%**	**15%**	**100%**	**100%**

Table A-18
2010 Medium-range: Total Boardings & Alightings, Constrained

	AM		MD		PM		NT		Daily	
Station	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**
North Station	270	2,540	310	510	2,250	310	830	300	3,660	3,660
Porter Square	180	1,140	210	230	1,040	230	390	200	1,820	1,800
Belmont	180	40	30	20	30	150	30	60	270	270
Waverly										
Waltham	480	100	100	80	110	420	70	160	760	760
Brandeis/Roberts	560	120	110	110	150	510	120	210	940	950
Kendall Green	100	10	20	10	10	90	10	30	140	140
Hastings										
Silver Hill										
Lincoln	270	40	50	30	40	240	40	90	400	400
Concord	390	70	70	60	70	340	70	130	600	600
West Concord	330	50	60	40	50	290	50	120	490	500
South Acton	460	60	90	50	60	410	60	150	670	670
Littleton	220	20	40	30	30	200	30	70	320	320
Regional I										
Ayer										
Regional II	360	40	70	40	40	320	30	120	500	520
Shirley										
North Leominister	200	20	40	20	20	180	30	70	290	290
Fitchburg	280	30	50	30	30	250	40	90	400	400
Wachusett										
Gardner										
Total	**4,280**	**4,280**	**1,250**	**1,260**	**3,930**	**3,940**	**1,800**	**1,800**	**11,260**	**11,280**
% of Daily Total	**39%**	**39%**	**11%**	**12%**	**36%**	**36%**	**17%**	**17%**	**103%**	**104%**

Table A-19
2010 No-Build: Inbound Boardings & Alightings, Unconstrained

	AM		MD		PM		NT		Daily	
Station	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**
North Station	-	3,130	-	630	-	370	-	380	-	4,510
Porter Square	60	1,430	80	270	40	160	10	170	190	2,030
Belmont	150	20	30	-	20	-	20	-	220	20
Waverly	110	20	20	10	10	-	10	-	150	30
Waltham	530	70	100	30	60	10	60	10	750	120
Brandeis/Roberts	620	80	120	20	70	30	80	20	890	150
Kendall Green	110	-	20	-	10	-	20	-	160	-
Hastings	40	-	10	-	-	-	10	-	60	-
Silver Hill	20	-	-	-	-	-	10	-	30	-
Lincoln	350	10	70	10	40	-	40	-	500	20
Concord	510	30	90	10	60	10	70	10	730	60
West Concord	510	10	90	-	60	-	70	-	730	10
South Acton	640	10	120	-	70	-	80	-	910	10
Littleton	250	-	50	-	30	-	20	-	350	-
Regional I										
Ayer										
Regional II	380	-	70	-	40	-	*30*	-	*540*	-
Shirley										
North Leominister	210	-	40	-	20	-	30	-	300	-
Fitchburg	320	-	60	-	40	-	30	-	450	-
Wachusett										
Gardner										
Total	**4,810**	**4,810**	**970**	**980**	**570**	**580**	**590**	**590**	**6,960**	**6,960**
% of Daily Total	**35%**	**35%**	**7%**	**7%**	**4%**	**4%**	**4%**	**4%**	**50%**	**50%**

Table A-20
2010 Medium-range: Inbound Boardings & Alightings, Unconstrained

Station	**AM**		**MD**		**PM**		**NT**		**Daily**	
	Boarding	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**
North Station	-	3,270	-	630	-	380	-	400	-	4,680
Porter Square	60	1,470	70	270	40	160	20	190	190	2,090
Belmont	190	30	40	-	20	-	20	-	270	30
Waverly										
Waltham	570	70	110	30	70	20	70	10	820	130
Brandeis/Roberts	670	90	120	50	80	40	80	20	950	200
Kendall Green	130	-	20	-	20	-	20	-	190	-
Hastings										
Silver Hill										
Lincoln	390	10	70	10	40	-	50	-	550	20
Concord	530	10	100	10	60	10	60	-	750	30
West Concord	510	10	90	-	60	-	70	-	730	10
South Acton	640	10	120	-	70	-	80	-	910	10
Littleton	270	-	50	-	30	-	40	-	390	-
Regional I										
Ayer										
Regional II	430	-	80	-	50	-	*30*	-	*620*	-
Shirley										
North Leominister	230	-	40	-	30	-	30	-	330	-
Fitchburg	350	-	70	-	40	-	40	-	500	-
Wachusett										
Gardner										
Total	**4,970**	**4,970**	**980**	**1,000**	**610**	**610**	**610**	**620**	**7,200**	**7,200**
% of Daily Total	**69%**	**69%**	**14%**	**14%**	**8%**	**8%**	**8%**	**9%**	**100%**	**100%**

Table A-21
2010 No-Build: Outbound Boardings & Alightings, Unconstrained

	AM		MD		PM		NT		Daily	
Station	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**
North Station	340	-	380	-	2,770	-	1,020	-	4,510	-
Porter Square	150	20	170	10	1,250	100	460	50	2,030	190
Belmont	-	20	-	20	10	140	10	50	20	220
Waverly	-	10	-	10	20	90	10	30	30	150
Waltham	10	50	10	60	70	460	30	170	120	750
Brandeis/Roberts	10	70	10	70	90	550	40	200	150	890
Kendall Green	-	10	-	10	-	100	-	40	-	160
Hastings	-	-	-	10	-	40	-	10	-	60
Silver Hill	-	-	-	-	-	20	-	10	-	30
Lincoln	-	40	-	40	10	310	10	110	20	500
Concord	-	50	10	60	40	450	10	170	60	730
West Concord	-	50	-	60	10	450	-	170	10	730
South Acton	-	70	-	80	10	560	-	210	10	910
Littleton	-	30	-	30	-	220	-	80	-	350
Regional I										
Ayer										
Regional II	-	*40*	-	*50*	-	*330*	-	*120*	-	*540*
Shirley										
North Leominister	-	20	-	30	-	180	-	70	-	300
Fitchburg	-	30	-	40	-	280	-	100	-	450
Wachusett										
Gardner										
Total	**510**	**510**	**580**	**580**	**4,280**	**4,280**	**1,590**	**1,590**	**6,960**	**6,960**
% of Daily Total	**4%**	**4%**	**4%**	**4%**	**31%**	**31%**	**11%**	**11%**	**50%**	**50%**

Table A-22
2010 Medium-range: Outbound Boardings & Alightings, Unconstrained

	AM		MD		PM		NT		Daily	
Station	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**
North Station	350	-	400	-	2,880	-	1,050	-	4,680	-
Porter Square	160	-	180	20	1,290	110	460	10	2,090	190
Belmont	-	40	-	20	20	170	10	60	30	270
Waverly										
Waltham	10	60	10	70	80	500	30	190	130	820
Brandeis/Roberts	20	70	20	80	120	580	40	220	200	950
Kendall Green	-	10	-	20	-	120	-	40	-	190
Hastings										
Silver Hill										
Lincoln	-	40	-	50	10	340	10	130	20	550
Concord	-	50	-	60	20	460	10	170	30	750
West Concord	-	50	-	60	10	450	-	170	10	730
South Acton	-	70	-	80	10	560	-	210	10	910
Littleton	-	30	-	30	-	240	-	90	-	390
Regional I										
Ayer										
Regional II	-	*50*	-	*50*	-	*380*	-	*140*	-	*620*
Shirley										
North Leominister	-	20	-	30	-	200	-	80	-	330
Fitchburg	-	40	-	40	-	310	-	110	-	500
Wachusett										
Gardner										
Total	**540**	**530**	**610**	**610**	**4,440**	**4,420**	**1,610**	**1,620**	**7,200**	**7,200**
% of Daily Total	**8%**	**7%**	**8%**	**8%**	**62%**	**61%**	**22%**	**23%**	**100%**	**100%**

Table A-23
2010 No-Build: Total Boardings & Alightings, Unconstrained

	AM		MD		PM		NT		Daily	
Station	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**
North Station	340	3,130	380	630	2,770	360	1,020	380	4,510	4,510
Porter Square	210	1,450	250	280	1,290	260	470	220	2,220	2,210
Belmont	150	40	30	20	30	140	30	50	240	250
Waverly	110	30	20	20	30	90	20	30	180	170
Waltham	540	120	110	90	130	470	90	180	870	860
Brandeis/Roberts	630	150	130	90	160	580	120	220	1,040	1,040
Kendall Green	110	10	20	10	10	100	20	40	160	160
Hastings	40	-	10	10	-	40	10	10	60	60
Silver Hill	20	-	-	-	-	20	10	10	30	30
Lincoln	350	50	70	50	50	310	50	110	520	520
Concord	510	80	100	70	100	460	80	180	790	790
West Concord	510	60	90	60	70	450	70	170	740	740
South Acton	640	80	120	80	80	560	80	210	920	930
Littleton	250	30	50	30	30	220	20	80	350	360
Regional I										
Ayer										
Regional II	380	40	70	50	40	330	30	120	520	540
Shirley										
North Leominister	210	20	40	30	20	180	30	70	300	300
Fitchburg	320	30	60	40	40	280	30	100	450	450
Wachusett										
Gardner										
Total	**5,320**	**5,320**	**1,550**	**1,560**	**4,850**	**4,850**	**2,180**	**2,180**	**13,900**	**13,920**
% of Daily Total	**38%**	**38%**	**11%**	**11%**	**35%**	**35%**	**16%**	**16%**	**100%**	**100%**

Table A-24
2010 Medium-range: Total Boardings & Alightings, Unconstrained

	AM		MD		PM		NT		Daily	
Station	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**
North Station	350	3,270	400	630	2,880	380	1,050	400	4,680	4,680
Porter Square	220	1,470	250	290	1,330	270	480	200	2,280	2,230
Belmont	190	70	40	20	40	170	30	60	300	320
Waverly										
Waltham	580	130	120	100	150	520	100	200	950	950
Brandeis/Roberts	690	160	140	130	200	620	120	240	1,150	1,150
Kendall Green	130	10	20	20	20	120	20	40	190	190
Hastings										
Silver Hill										
Lincoln	390	50	70	60	50	340	60	130	570	580
Concord	530	60	100	70	80	470	70	170	780	770
West Concord	510	60	90	60	70	450	70	170	740	740
South Acton	640	80	120	80	80	560	80	210	920	930
Littleton	270	30	50	30	30	240	40	90	390	390
Regional I										
Ayer										
Regional II	430	50	80	50	50	380	30	140	590	620
Shirley										
North Leominister	230	20	40	30	30	200	30	80	330	330
Fitchburg	350	40	70	40	40	310	40	110	500	500
Wachusett										
Gardner										
Total	**5,510**	**5,500**	**1,590**	**1,610**	**5,050**	**5,030**	**2,220**	**2,240**	**14,370**	**14,380**
% of Daily Total	**40%**	**40%**	**11%**	**12%**	**36%**	**36%**	**16%**	**16%**	**100%**	**100%**

Table A-25
2025 No-Build: Inbound Boardings & Alightings, Constrained

	AM		**MD**		**PM**		**NT**		**Daily**	
Station	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**
North Station	-	2,440	-	510	-	300	-	290	-	3,540
Porter Square	60	1,110	80	210	40	130	10	130	190	1,580
Belmont	140	20	30	-	20	-	10	-	200	20
Waverly	110	20	20	10	10	-	10	-	150	30
Waltham	410	50	80	20	50	10	50	10	590	90
Brandeis/Roberts	520	50	100	30	60	20	60	10	740	110
Kendall Green	80	-	20	-	10	-	10	-	120	-
Hastings	40	-	10	-	-	-	10	-	60	-
Silver Hill	20	-	-	-	-	-	10	-	30	-
Lincoln	250	10	50	-	30	-	20	-	350	10
Concord	380	30	70	10	40	-	50	-	540	40
West Concord	330	10	60	-	40	-	40	-	470	10
South Acton	460	10	90	-	50	-	60	-	660	10
Littleton	210	-	40	-	20	-	30	-	300	-
Regional I										
Ayer										
Regional II	310	-	60	-	40	-	*30*	-	*440*	-
Shirley										
North Leominister	180	-	30	-	20	-	20	-	250	-
Fitchburg	250	-	50	-	30	-	20	-	350	-
Wachusett										
Gardner										
Total	**3,750**	**3,750**	**790**	**790**	**460**	**460**	**440**	**440**	**5,440**	**5,440**
% of Daily Total	**69%**	**69%**	**15%**	**15%**	**8%**	**8%**	**8%**	**8%**	**100%**	**100%**

Table A-26
2025 Long-range: Inbound Boardings & Alightings, Constrained

Station	**AM**		**MD**		**PM**		**NT**		**Daily**	
	Boarding	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**
North Station	-	2,570	-	570	-	350	-	230	-	3,720
Porter Square	50	1,760	100	280	60	210	30	90	240	2,340
Belmont	210	20	30	-	20	-	20	-	280	20
Waverly										
Waltham	540	100	110	50	70	30	40	20	760	200
Brandeis/Roberts	630	110	130	50	80	50	40	40	880	250
Kendall Green	110	-	30	-	10	-	30	-	180	-
Hastings										
Silver Hill										
Lincoln	310	40	60	30	40	-	30	-	440	70
Concord	440	50	120	50	70	20	40	10	670	130
West Concord	420	20	100	-	70	-	30	-	620	20
South Acton	560	10	100	-	70	-	30	-	760	10
Littleton										
Regional I	*340*	-	*60*	-	*30*	-	*10*	-	*440*	-
Ayer										
Regional II	450	-	80	-	50	-	*20*	-	*600*	-
Shirley										
North Leominister	240	-	50	-	40	-	30	-	360	-
Fitchburg	240	-	30	-	20	-	20	-	310	-
Wachusett	*90*	-	*30*	-	*20*	-	*20*	-	*160*	-
Gardner	*50*	-	*-*	-	*10*	-	*-*	-	*60*	-
Total	**4,680**	**4,680**	**1,030**	**1,030**	**660**	**660**	**390**	**390**	**6,760**	**6,760**
% of Daily Total	**69%**	**69%**	**15%**	**15%**	**10%**	**10%**	**6%**	**6%**	**100%**	**100%**

Table A-27
2025 No-Build: Outbound Boardings & Alightings, Constrained

	AM		MD		PM		NT		Daily	
Station	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**
North Station	210	-	300	-	2,090	-	880	-	3,480	-
Porter Square	190	30	200	10	1,350	120	520	80	2,260	240
Belmont	-	10	-	20	20	120	-	50	20	200
Waverly	-	20	-	20	20	100	10	30	30	170
Waltham	20	30	20	50	80	440	30	170	150	690
Brandeis/Roberts	20	70	10	70	100	510	70	220	200	870
Kendall Green	-	20	-	10	-	80	-	50	-	160
Hastings	-	-	-	10	-	60	-	20	-	90
Silver Hill	-	-	-	-	-	40	-	10	-	50
Lincoln	-	30	-	30	20	220	30	120	50	400
Concord	10	50	20	50	50	360	30	160	110	620
West Concord	-	30	-	30	20	340	-	140	20	540
South Acton	10	40	-	70	-	420	-	190	10	720
Littleton	-	30	-	40	-	200	-	80	-	350
Regional I										
Ayer										
Regional II	-	*30*	-	*50*	-	*330*	-	*110*	-	520
Shirley										
North Leominister	-	30	-	40	-	190	-	50	-	310
Fitchburg	-	40	-	50	-	220	-	90	-	400
Wachusett										
Gardner										
Total	**460**	**460**	**550**	**550**	**3,750**	**3,750**	**1,570**	**1,570**	**6,330**	**6,330**
% of Daily Total	**7%**	**7%**	**9%**	**9%**	**59%**	**59%**	**25%**	**25%**	**100%**	**100%**

Table A-28
2025 Long-range: Outbound Boardings & Alightings, Constrained

	2025 Constrained Long Range Action Outbound Boardings & Alightings									
	AM		MD		PM		NT		Daily	
Station	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**
North Station	240	-	310	-	2,130	-	1,040	-	3,720	-
Porter Square	190	30	210	10	1,470	120	460	70	2,330	230
Belmont	-	10	-	30	10	160	-	70	10	270
Waverly										
Waltham	20	20	30	70	80	380	20	240	150	710
Brandeis/Roberts	20	50	20	90	100	550	110	190	250	880
Kendall Green	-	20	-	20	-	120	-	20	-	180
Hastings										
Silver Hill										
Lincoln	-	50	10	40	30	230	20	110	60	430
Concord	-	50	30	50	50	370	30	180	110	650
West Concord	-	70	-	70	10	350	10	130	20	620
South Acton	-	60	-	80	10	380	-	240	10	760
Littleton										
Regional I	-	-	-	*40*	-	*240*	-	*160*	-	*440*
Ayer									-	
Regional II	-	*40*	-	*50*	-	*370*	-	*140*	-	*600*
Shirley										
North Leominister	-	40	-	30	-	220	-	70	-	360
Fitchburg	-	20	-	30	-	230	-	30	-	310
Washusett	-	*10*	-	-	-	*120*	-	*30*	-	*160*
Gardner	-	-	-	-	-	*50*	-	*10*	-	*60*
Total Fitchburg Line	**470**	**470**	**610**	**610**	**3,890**	**3,890**	**1,690**	**1,690**	**6,660**	**6,660**
% of Daily	**7%**	**7%**	**9%**	**9%**	**58%**	**58%**	**25%**	**25%**	**100%**	**100%**

Table A-29
2025 No-Build: Total Boardings & Alightings, Constrained

	AM		MD		PM		NT		Daily	
Station	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**
North Station	210	2,430	300	510	2,090	350	880	190	3,480	3,480
Porter Square	240	1,710	300	320	1,410	290	550	180	2,500	2,500
Belmont	130	30	30	20	40	120	20	50	220	220
Waverly	130	40	20	30	30	100	20	30	200	200
Waltham	520	110	100	90	150	460	70	180	840	840
Brandeis/Roberts	640	160	130	100	180	550	120	260	1,070	1,070
Kendall Green	110	20	30	10	10	80	10	50	160	160
Hastings	50	-	10	10	20	60	10	20	90	90
Silver Hill	40	-	10	-	-	40	-	10	50	50
Lincoln	300	60	50	50	50	220	50	120	450	450
Concord	430	90	130	90	110	380	60	170	730	730
West Concord	380	50	90	30	70	340	20	140	560	560
South Acton	570	50	90	70	50	420	20	190	730	730
Littleton	260	30	50	40	30	200	10	80	350	350
Regional I										
Ayer										
Regional II	400	30	70	50	40	330	10	110	520	520
Shirley										
North Leominister	200	30	50	40	30	190	30	50	310	310
Fitchburg	270	40	50	50	40	220	40	90	400	400
Wachusett										
Gardner										
Total	**4,880**	**4,880**	**1,510**	**1,510**	**4,350**	**4,350**	**1,920**	**1,920**	**12,660**	**12,660**
% of Daily Total	**38.5%**	**38.5%**	**11.9%**	**11.9%**	**34.4%**	**34.4%**	**15.2%**	**15.2%**	**100%**	**100%**

Table A-30
2025 Long-range: Total Boardings & Alightings, Constrained

	AM		**MD**		**PM**		**NT**		**Daily**	
Station	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**
North Station	240	2,570	310	570	2,130	350	1,040	230	3,720	3,720
Porter Square	240	1,790	310	290	1,530	330	490	160	2,570	2,570
Belmont	210	30	30	30	30	160	20	70	290	290
Waverly										
Waltham	560	120	140	120	150	410	60	260	910	910
Brandeis/Roberts	650	160	150	140	180	600	150	230	1,130	1,130
Kendall Green	110	20	30	20	10	120	30	20	180	180
Hastings										
Silver Hill										
Lincoln	310	90	70	70	70	230	50	110	500	500
Concord	440	100	150	100	120	390	70	190	780	780
West Concord	420	90	100	70	80	350	40	130	640	640
South Acton	560	70	100	80	80	380	30	240	770	770
Littleton										
Regional I	*340*	-	60	40	30	240	10	160	440	440
Ayer										
Regional II	450	40	80	50	50	370	20	140	600	600
Shirley										
North Leominister	240	40	50	30	40	220	30	70	360	360
Fitchburg	240	20	30	30	20	230	20	30	310	310
Wachusett	*90*	10	30	-	20	120	20	30	160	160
Gardner	*50*	-	-	-	10	50	-	10	60	60
Total	**5,150**	**5,150**	**1,640**	**1,640**	**4,550**	**4,550**	**2,080**	**2,080**	**13,420**	**13,420**
% of Daily Total	**38.4%**	**38.4%**	**12.2%**	**12.2%**	**33.9%**	**33.9%**	**15.5%**	**15.5%**	**100%**	**100%**

Table A-31
2025 No-Build: Inbound Boardings & Alightings, Unconstrained

	AM		MD		PM		NT		Daily	
Station	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**
North Station	-	3,800	-	660	-	440	-	420	-	5,320
Porter Square	50	1,790	100	410	60	210	30	170	240	2,580
Belmont	150	20	30	-	20	-	20	-	220	20
Waverly	130	20	20	10	10	-	10	-	170	30
Waltham	580	80	110	40	70	20	70	10	830	150
Brandeis/Roberts	730	90	140	30	80	40	90	40	1,040	200
Kendall Green	180	-	30	-	20	-	20	-	250	-
Hastings	50	-	10	-	20	-	10	-	90	-
Silver Hill	40	-	10	-	-	-	-	-	50	-
Lincoln	460	30	80	20	50	-	50	-	640	50
Concord	640	40	120	40	70	20	70	10	900	110
West Concord	620	20	120	-	70	-	70	-	880	20
South Acton	860	10	160	-	100	-	70	-	1,190	10
Littleton	320	-	60	-	40	-	40	-	460	-
Regional I										
Ayer										
Regional II	490	-	90	-	50	-	30	-	660	-
Shirley										
North Leominister	250	-	60	-	30	-	30	-	370	-
Fitchburg	350	-	70	-	40	-	40	-	500	-
Wachusett										
Gardner										
Total	**5,900**	**5,900**	**1,210**	**1,210**	**730**	**730**	**650**	**650**	**8,490**	**8,490**
% of Daily Total	**69%**	**69%**	**14%**	**14%**	**9%**	**9%**	**8%**	**8%**	**100%**	**100%**

Table A-32
2025 Long-range: Inbound Boardings & Alightings, Unconstrained

Station	**AM**		**MD**		**PM**		**NT**		**Daily**	
	Boarding	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**
North Station	-	3,890	-	660	-	430	-	450	-	5,430
Porter Square	90	1,930	120	460	70	250	30	160	310	2,800
Belmont	230	30	50	-	20	-	20	-	320	30
Waverly										
Waltham	650	90	110	50	70	30	30	20	860	190
Brandeis/Roberts	730	110	140	50	80	50	40	40	990	250
Kendall Green	180	-	30	-	20	-	70	-	300	-
Hastings										
Silver Hill										
Lincoln	460	50	90	30	50	-	50	-	650	80
Concord	660	50	130	50	70	20	80	10	940	130
West Concord	660	20	130	-	80	-	80	-	950	20
South Acton	880	10	180	-	100	-	80	-	1,240	10
Littleton										
Regional I	*420*	-	*80*	-	*50*	-	*70*	-	*620*	-
Ayer										
Regional II	550	-	100	-	60	-	*50*	-	*760*	-
Shirley										
North Leominister	310	-	70	-	50	-	30	-	460	-
Fitchburg	190	-	40	-	30	-	30	-	290	-
Washusett	*120*	-	*30*	-	*20*	-	*20*	-	*190*	-
Gardner	*50*	-	-	-	*10*	-	-	-	*60*	-
Total	**6,180**	**6,180**	**1,300**	**1,300**	**780**	**780**	**680**	**680**	**8,940**	**8,940**
% of Daily Total	**69%**	**69%**	**15%**	**15%**	**9%**	**9%**	**8%**	**8%**	**100%**	**100%**

Table A-33
2025 No-Build: Outbound Boardings & Alightings, Unconstrained

	AM		MD		PM		NT		Daily	
Station	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**
North Station	380	-	390	-	3,210	-	1,390	-	5,370	-
Porter Square	190	30	200	-	1,510	110	630	90	2,530	230
Belmont	-	20	-	20	20	140	10	50	30	230
Waverly	-	20	-	10	10	100	10	40	20	170
Waltham	20	50	20	50	70	530	40	200	150	830
Brandeis/Roberts	20	90	10	90	100	620	70	240	200	1,040
Kendall Green	-	20	-	20	-	140	-	70	-	250
Hastings	-	-	-	10	-	60	-	20	-	90
Silver Hill	-	-	-	-	-	30	-	20	-	50
Lincoln	10	50	10	50	10	390	20	150	50	640
Concord	10	80	30	80	50	520	20	220	110	900
West Concord	-	70	-	60	20	540	-	210	20	880
South Acton	10	60	-	80	-	630	-	420	10	1,190
Littleton	-	30	-	40	-	250	-	140	-	460
Regional I										
Ayer										
Regional II	-	*50*	-	*60*	-	*410*	-	*140*	-	660
Shirley										
North Leominister	-	30	-	40	-	230	-	70	-	370
Fitchburg	-	40	-	50	-	300	-	110	-	500
Wachusett										
Gardner										
Total	**640**	**640**	**660**	**660**	**5,000**	**5,000**	**2,190**	**2,190**	**8,490**	**8,490**
% of Daily Total	**8%**	**8%**	**8%**	**8%**	**59%**	**59%**	**26%**	**26%**	**100%**	**100%**

Table A-34
2025 Long-range: Outbound Boardings & Alightings, Unconstrained

Station	AM		MD		PM		NT		Daily	
	Boarding	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**
North Station	410	-	450	-	3,090	-	1,460	-	5,410	-
Porter Square	180	30	180	-	1,670	130	810	180	2,840	340
Belmont	-	20	-	20	10	210	10	70	20	320
Waverly										
Waltham	20	90	20	70	130	460	20	210	190	830
Brandeis/Roberts	20	90	20	100	160	600	50	200	250	990
Kendall Green	-	-	-	10	-	200	-	90	-	300
Hastings										
Silver Hill										
Lincoln	10	50	10	30	30	400	20	170	70	650
Concord	10	80	30	90	60	550	30	220	130	940
West Concord	-	80	-	70	20	560	-	240	20	950
South Acton	-	70	-	70	10	690	-	440	10	1,270
Littleton										
Regional I	-	*10*	-	*70*	-	*320*	-	*200*	-	*600*
Ayer									-	
Regional II	-	*20*	-	*50*	-	*490*	-	*200*	-	*760*
Shirley										
North Leominister	-	40	-	70	-	260	-	80	-	450
Fitchburg	-	60	-	30	-	140	-	60	-	290
Wachusett	-	*10*	-	*30*	-	*120*	-	*30*	-	*190*
Gardner	-	-	-	-	-	*50*	-	*10*	-	*60*
Total	**650**	**650**	**710**	**710**	**5,180**	**5,180**	**2,400**	**2,400**	**8,940**	**8,940**
% of Daily Total	**7%**	**7%**	**8%**	**8%**	**58%**	**58%**	**27%**	**27%**	**100%**	**100%**

Table A-35
2025 No-Build: Total Boardings & Alightings, Unconstrained

	AM		MD		PM		NT		Daily	
Station	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**
North Station	380	3,800	390	660	3,210	440	1,390	420	5,370	5,320
Porter Square	240	1,820	300	410	1,570	320	660	260	2,770	2,810
Belmont	150	40	30	20	40	140	30	50	250	250
Waverly	130	40	20	20	20	100	20	40	190	200
Waltham	600	130	130	90	140	550	110	210	980	980
Brandeis/Roberts	750	180	150	120	180	660	160	280	1,240	1,240
Kendall Green	180	20	30	20	20	140	20	70	250	250
Hastings	50	-	10	10	20	60	10	20	90	90
Silver Hill	40	-	10	-	-	30	-	20	50	50
Lincoln	470	80	90	70	60	390	70	150	690	690
Concord	650	120	150	120	120	540	90	230	1,010	1,010
West Concord	620	90	120	60	90	540	70	210	900	900
South Acton	870	70	160	80	100	630	70	420	1,200	1,200
Littleton	320	30	60	40	40	250	40	140	460	460
Regional I										
Ayer										
Regional II	490	50	90	60	50	410	30	140	660	660
Shirley										
North Leominister	250	30	60	40	30	230	30	70	370	370
Fitchburg	350	40	70	50	40	300	40	110	500	500
Wachusett										
Gardner										
Total	**6,540**	**6,540**	**1,870**	**1,870**	**5,730**	**5,730**	**2,840**	**2,840**	**16,980**	**16,980**
% of Daily Total	**38.5%**	**38.5%**	**11.0%**	**11.0%**	**33.7%**	**33.7%**	**16.7%**	**16.7%**	**100%**	**100%**

Table A-36
2025 Long-range: Total Boardings & Alightings, Unconstrained

	AM		MD		PM		NT		Daily	
Station	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**
North Station	410	3,890	450	660	3,090	430	1,460	450	5,410	5,430
Porter Square	270	1,960	300	460	1,740	380	840	340	3,150	3,140
Belmont	230	50	50	20	30	210	30	70	340	350
Waverly										
Waltham	670	180	130	120	200	490	50	230	1,050	1,020
Brandeis/Roberts	750	200	160	150	240	650	90	240	1,240	1,240
Kendall Green	180	-	30	10	20	200	70	90	300	300
Hastings										
Silver Hill										
Lincoln	470	100	100	60	80	400	70	170	720	730
Concord	670	130	160	140	130	570	110	230	1,070	1,070
West Concord	660	100	130	70	100	560	80	240	970	970
South Acton	880	80	180	70	110	690	80	440	1,250	1,280
Littleton										
Regional I	*420*	10	80	70	50	320	70	200	620	600
Ayer										
Regional II	550	20	100	50	60	490	50	200	760	760
Shirley										
North Leominister	310	40	70	70	50	260	30	80	460	450
Fitchburg	190	60	40	30	30	140	30	60	290	290
Wachusett	*120*	10	30	30	20	120	20	30	190	190
Gardner	*50*	-	-	-	10	50	-	10	60	60
Total	**6,830**	**6,830**	**2,010**	**2,010**	**5,960**	**5,960**	**3,080**	**3,080**	**17,880**	**17,880**
% of Daily Total	**38.2%**	**38.2%**	**11.2%**	**11.2%**	**33.3%**	**33.3%**	**17.2%**	**17.2%**	**100%**	**100%**

Appendix E: Cost Estimates

Fitchburg Commuter Rail Improvements
Preliminary Cost Estimate

Proposed Capital Improvement Summary:

ITEM	UNIT	UNIT COST	QUANTITY	COST
Double Track within Waltham [1]	MI	$1,320,000	0.7	$924,000
Double Track between Ayer and Acton [2]	MI	$1,320,000	9	$11,880,000
Littleton Station Improvements [3]	LS	$4,000,000	1	$4,000,000
Additional Train Set (7 cars & 1 Locomotive)				
7 Coaches Double Decker Cars	EA	$2,300,000	7	$16,100,000
1 Locomotive	EA	$3,000,000	1	$3,000,000
Signal Improvements [4]	LS	$5,000,000	1	$5,000,000
Widening grade-crossings and modifications to crossing protection devices[5]	LS	$170,000	10	$1,700,000
			Sub-Total:	$41,680,000
			Contingency (15%):	$6,252,000
			Sub-Total:	$47,932,000
			Escalation to 2005 @ 5%/year:	$55,487,282

1 - assumes MassHighway reconstructing existing bridges to accommodate double track.

2 - assumes existing rail bed and right-of-way sufficient for additional track.

3- Littleton Station includes 150 space parking expansion ($750,000) and platform improvements ($3.25 million)

4 - includes all signal improvements and interlocking.

5 - Based on the advice of MBTA railroad operations, grade crossing improvements included for a total cost of $1,700,000

6 - annual operating cost per set of train is $2,240,000 not included in the proposed total capital improvement.

Gardner Station Preliminary Cost Estimate[1]

New Station Construction	
Full-length, high-level platform	$3,000,000
Rail Siding	$300,000
Train Approach Warning System	$100,000
Track and Yard Improvements	
Double Track from Wachusett to Gardner Station (11 miles)	$18,150,000
Existing Track Upgrade Wachusett to Gardner Station	$9,075,000
Subtotal	$30,625,000
Project Management/Construction Management[2]	$1,531,250
Design[3]	$3,062,500
Contingency[4]	$15,312,500
Subtotal PM/CM, Design and Contingency	$19,906,250
Total	$50,531,250

1. Gardner Station Preliminary Cost Estimate based on the assumption that Wachusett Station has been built with required upgrades from Fitchburg to Wachusett.
2. PM/CM costs are estimated at 5% of construction costs.
3. Design costs are estimated at 10% of construction costs.
4. Contingency costs are estimated at 50% of construction costs per FTA.

*** Assuming CTPS estimates of 50 additional passengers per day, the average cost per person over the life of the project (20 years) is approximately $230 per person.**

Note: Gardner preliminary cost estimate does not include the construction of a new layover facility, which may be necessary.

April 5, 2004

Wachusett Station Preliminary Cost Estimate Alternate B

Real Estate and Parking Lot	
Acquire 3.0 Acres @ $200,000/acre	$600,000
Acquire 8.0 Acres @ $100,000/acre	$800,000
500 Space Parking Lot @ $3,000/space	$1,500,000
New Station Construction	
Full-length, high-level platform	$3,000,000
Interlocking Installation at Fitchburg and Wachusett Stations	$5,000,000
Rail Siding	$300,000
Train Approach Warning System	$100,000
Track and Yard Improvements	
Track Upgrade Fitchburg to Wachusett Station	$4,000,000
Six Track Layover Facility at Wachusett Station[1]	$7,000,000
Bridge Upgrades[2]	$2,000,000
Subtotal	$24,300,000
Project Management/Construction Management[3]	$1,145,000
Design[4]	$2,290,000
Contingency[5]	$11,450,000
Subtotal PM/CM, Design and Contingency	$14,885,000
Total	$39,185,000

1. Layover will require a minimum of seven acres
2. Budgeted for various bridge repairs.
3. PM/CM costs are estimated at 5% of construction costs
4. Design costs are estimated at 10% of construction costs
5. Contingency costs are estimated at 50% of construction costs per FTA

Notes

This preliminary cost estimate does not include a budget for additional rolling stock. We suggest that a six-car train set and locomotive would be required to provide additional express service. This would add approximately $8,000,000 to the project cost.

This preliminary cost estimate also assumes no operating cost for leasing track from Guilford Rail System. In exchange for permanent access to Guilford-owned track, we propose to capitalize these costs through an agreement with Guilford that would call for reinstalling a second track for 11 miles between Wachusett Station and Gardner. This proposal would add $18,150,000 to the cost estimate.